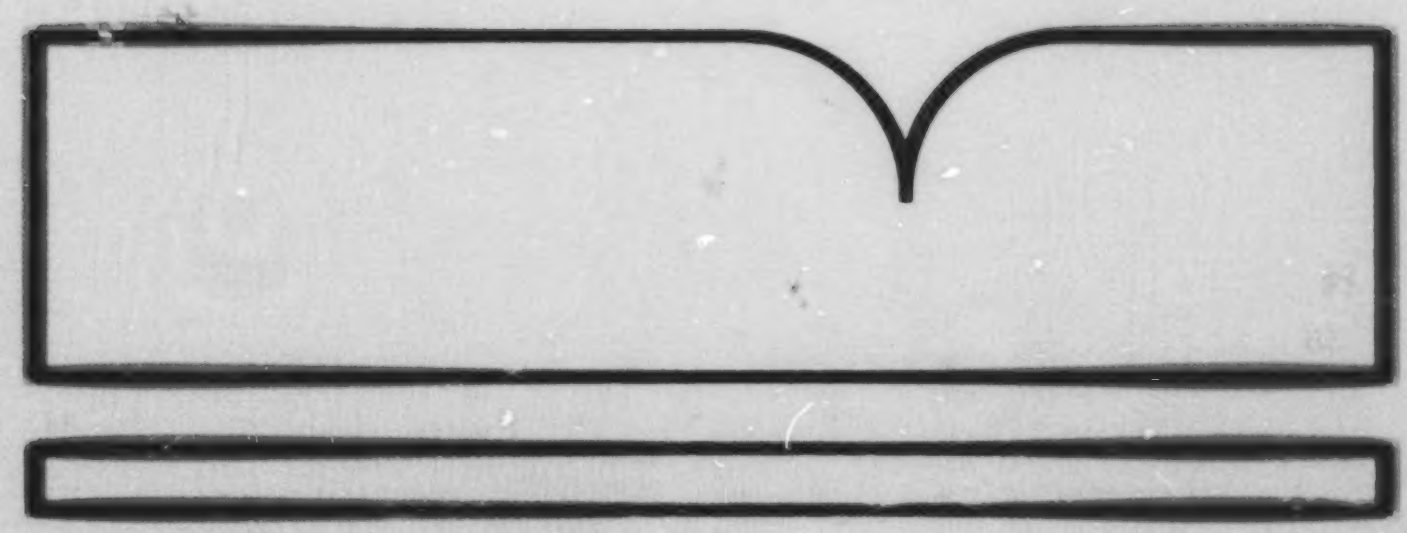
PB89-196729

Superfund Record of Decision (EPA Region 4) Celanese Fibers Operations, Shelby, North Carolina (First Remedial Action), March 1988

(U.S.) Environmental Protection Agency, Washington, DC

23 Mar 88



U.S. Department of Commerce
National Technical Information Service

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R04-88/038
March 1988

PB89-196729

EPA

Superfund Record of Decision:

Celanese Fibers Operations, NC

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 450-acre Celanese Fiber Operations (CFO) site is occupied by a polyester raw-material production facility, and is located in Cleveland County, one mile north of Earl, North Carolina. The plant facilities consist of the plant production area, wastewater treatment area, former waste disposal areas, land farm area, and recreation and tree farm areas south of the main plant. The plant began operations in 1960 as Fibers Industries, Inc. and manufactured polyester polymer chip and filament yarn using the chemicals dimethyl terephthalate and ethylene glycol. Celanese Corporation bought the facility in 1983. The CFO waste treatment plant was constructed in phases concurrent with the manufacturing plant. This resulted in the disposal of chemical wastes directly into a drainage ditch during the early years of operation prior to completion of the waste treatment plant. Treated effluent has been discharged to Buffalo Creek since the mid-1960s, when CFO completed construction of the treatment plant. In addition to the discharge from the wastewater treatment plant, CFO also discharges alum-treated bandcaster water directly to Buffalo Creek. Several areas around the plant have been used for waste disposal, including old burning pits for normal plant wastes (polyester and trash), a glycol recovery unit sludge burial area, and a former drum storage and staging area (drums contained solutions that failed to

(See Attached Sheet)

con't on pg 2.

17. Document Analysis a. Descriptors

Record of Decision
Celanese Fibers Operations, NC
First Remedial Action
Contaminated Media: gw
Key Contaminants: VOCs (benzene, PCE), organics (phenols), metals (chromium)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 79
	20. Security Class (This Page) None	22. Price MF PC $15.95/$6.95

EPA/ROD/R04-88/038
Celanese Fibers Operations, NC
First Remedial Action

16. ABSTRACT (continued)

polymerize) excavated and backfilled in the mid-1960s, and two soak-away ponds formerly containing treated sanitary sewage. In addition, 4 areas of buried waste are located to the north and outside the main plant perimeter fence: a polymer and fiber landfill, a construction debris landfill, a 21-acre sludge disposal area, and a drum storage area which temporarily stored 2,000 to 3,000 drums of waste chemicals and solvents, including lab packs, from 1970 to 1978. The drums were removed and disposed of offsite by 1978. The primary contaminants of concern affecting the ground water include: VOCs including benzene and PCE, organics including phenols, and metals including chromium.

The selected remedial action for this site includes: ground water pump and treatment using air stripping, biological treatment, and carbon adsorption (if necessary), followed by discharge to the onsite wastewater treatment plant. If the treatment system effluent contains metals, such as chromium, above allowable discharge levels, the effluent will be treated using chemical precipitation. The estimated present worth cost for this remedial action is $2,032,000 with estimated present worth O&M of $1,069,230.

DECLARATION FOR THE ENFORCEMENT RECORD OF DECISION

SITE: CELANESE FIBERS OPERATIONS
SHELBY, NORTH CAROLINA

Statement of Purpose:

This decision document represents the selected remedial action for this site developed in accordance with CERCLA as amended by SARA, and to the extent practicable, the National Contingency Plan. The State of North Carolina concurs with the selected remedy.

Statement of Basis

This decision is based upon the administrative record for the Celanese Fibers Operations Site. The attached index identifies the items which comprise the administrative record upon which the selection of a remedial action is based.

Description of Selected Remedy:

- This is Operable Unit One of the Remedial Actions to be undertaken at the Site. It is a control measure to mitigate the threat of off-site migration (via groundwater) of contamination by organic compounds. The Feasibility Study (FS) for the contaminant source control is in progress.

- Groundwater Contamination

  o Installation of extraction wells into bedrock at the perimeter of the site.

  o Installation of shallow extraction wells directly downgradient of source area.

  o Pumping of contaminated water from interior wells to common holding tank then to the air stripping tower.

  o All contaminated water transported from the air stripping tower to the biological treatment system.

  o Water requiring additional treatment pumped to carbon adsorption filtration unit.

  o All water is to be discharged to the existing wastewater treatment system as long as current NPDES permit limitations are not violated.

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

3-23-88
Date

Lee A. DeHihns, III
Acting Regional Administrator

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ATTACHMENTS

	ATTACHMENT NUMBER
1.0 RESPONSIVENESS SUMMARY	1
2.0 ADMINISTRATIVE RECORD INDEX	2
3.0 STATE CONCURRENCE	3

ENFORCEMENT RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
CELANESE FIBERS OPERATIONS SITE
SHELBY, CLEVELAND COUNTY, NORTH CAROLINA

1.0 INTRODUCTION

The Celanese Fibers Operations Site was proposed for inclusion on the National Priorities List (NPL) in October 1984. A Remedial Investigation (RI) and Feasibility Study (FS) have been conducted at the site. Due to unusual waste characteristics at the site, more information will be required in order to select a permanent remedy for the contaminated soils and the source material. As a result, this site has been separated into Operable Units. Operable Unit 1, Groundwater Remediation, will be addressed now. A remedial alternative for the source and soils remediation will be selected in approximately one year.

The RI report for the whole site was finalized and presented to the public on July 21, 1987 in a public meeting. The FS, which develops and examines alternatives for remediation of the site was issued in draft form to the public on January 19, 1988. A public meeting to present the results of the FS was held on February 3, 1988 in Shelby, North Carolina.

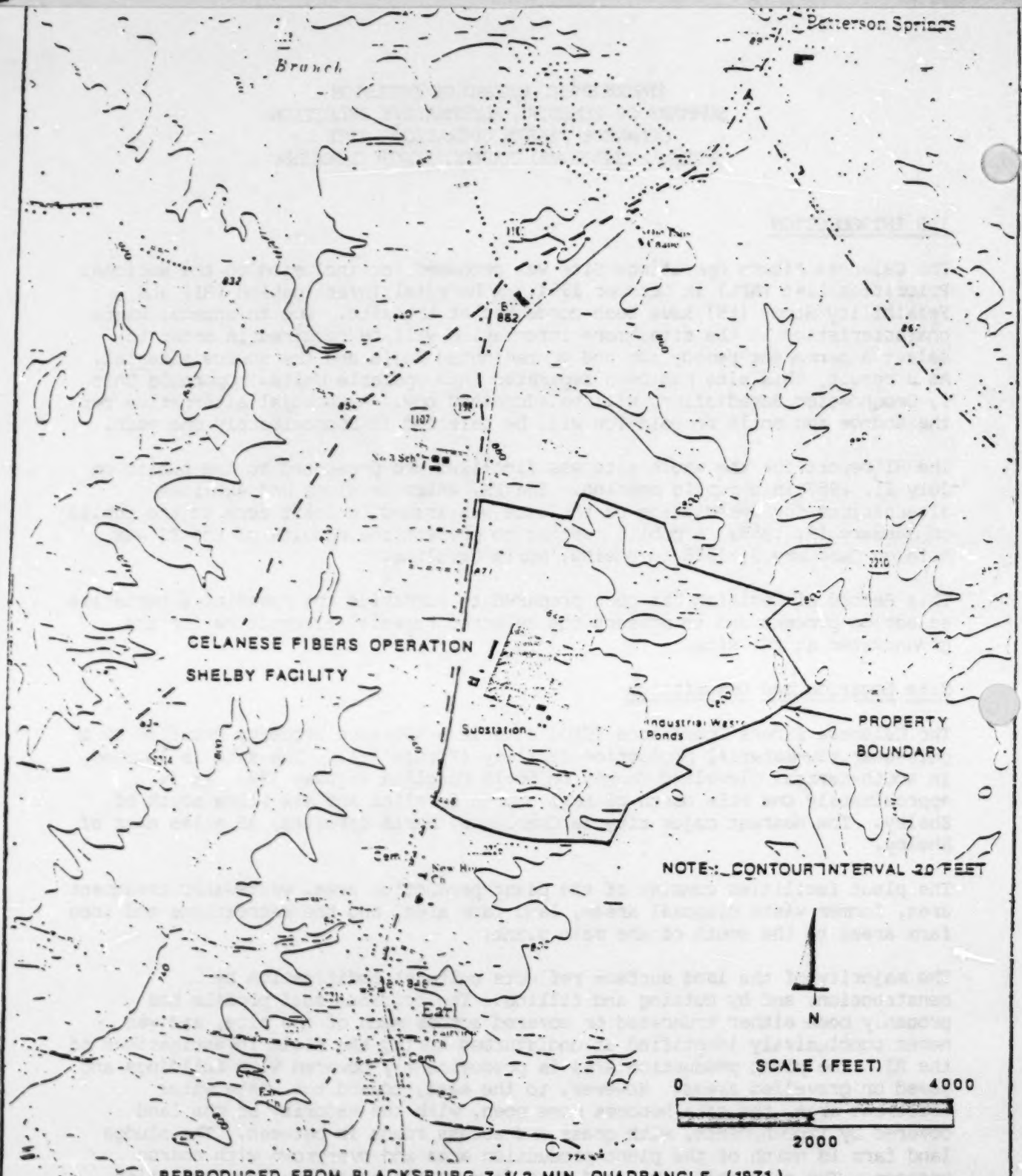
This Record of Decision has been prepared to summarize the remedial alternative selection process and to present the selected remedial alternative for the groundwater at the site.

Site Location and Description

The Celanese Fibers Operations (CFO) site is a 450-acre property occupied by a polyester raw-material production facility (Figure 1-1). The site is located in south-central Cleveland County on North Carolina Highway 198. It is approximately one mile north of Earl, North Carolina and six miles south of Shelby. The nearest major city is Charlotte, North Carolina, 35 miles east of Shelby.

The plant facilities consist of the plant production area, wastewater treatment area, former waste disposal areas, land farm area, and the recreations and tree farm areas to the south of the main plant.

The majority of the land surface reflects cultural modification by construction, and by cutting and filling. The original soil profile has probably been either truncated or covered across much of the site, and was never conclusively identified as undisturbed during the field investigations of the RI. The plant production area is predominantly covered with buildings and paved or gravelled areas. However, to the east, toward the waste water treatment area, the site becomes more open, with the majority of the land covered by impoundments, with grass and access roads in between. The sludge land farm is north of the plant production area and overgrown with coarse grasses. The recreation area and tree farm to the south have no facilities related to the plant processes.



REPRODUCED FROM BLACKSBURG 7 1/2 MIN. QUADRANGLE (1971)

SOIL & MATERIAL ENGINEERS INC.

FIGURE 1-1
SITE LOCATION MAP
CFO/ SHELBY, N.C.
S&ME JOB NO. 1175-85-050A

2.0 Site History

Fiber Industries, Inc., a joint venture of Celanese Corporation and Imperial Chemicals, Inc., was the original owner of the plant and operated it from 1960 until 1983 when the Celanese Corporation bought out the facility. Celanese now operates it as Celanese Fibers Operations (CFO).

Operations at the Shelby facility began in April of 1960. Manufacturing operations included the production of polyester polymer chip and filament yarn. The principal chemicals involved in polymer production are dimethyl terephthalate and ethylene glycol. Other small quantity additives include titanium dioxide and antimony.

The CFO waste treatment plant was constructed in phases concurrent with the manufacturing plant. During part of the early years, chemical wastes were discharged through a ditch draining in a generally easterly direction. The ditch began near the western edge of what is now known as the former drum storage area, and travelled east to the northeast corner of the present emergency spill ponds. The ditch was replaced with pipes when the waste treatment plant became fully operational in the mid-1960's. In 1973, the plant was expanded with the addition of a polishing pond, two emergency spill ponds, and an additional aeration basin. The treated effluent from the waste treatment plant is piped to a discharge point on Buffalo Creek.

The concrete-lined portions of the waste treatment facility include a chromate reduction pond which is no longer in use, a digester, three equalization basins, two aeration basins, and two clarifiers. The unlined plant units include the three polishing ponds, two sludge ponds, and two emergency spill ponds.

In addition to the discharge from the wastewater treatment plant, the Celanese facility also discharges alum treated bandcaster water directly to Buffalo Creek. Bandcaster water is used to cook the polymer products. Both of these discharges are covered by permits from the North Carolina Department of Natural Resources.

Several areas around the plant have been used for waste disposal. Normal plant wastes (primarily polyester and miscellaneous trash) were disposed of in old burning pits located just north of the aeration basins. North and east of the burning pits, Glycol Recovery Unit (GRU) sludge was buried during the early 1960's in trenches. West of the GRU sludge burial area is a former drum storage and staging area. Solutions which failed to polymerize were stored here during the early 1960's. The drums were removed in the mid-1960's and the storage area was backfilled. Two soak-away ponds located west of the existing aeration basins were used to contain treated sanitary sewage during the period from 1960 to 1969.

Four areas of buried waste are located to the north and outside of the main plant perimeter fence. The polymer and fiber landfill contains primarily non-hazardous inert materials such as excavation spoil, polymer, and waste yarn. The construction debris landfill contains items such as old cinder

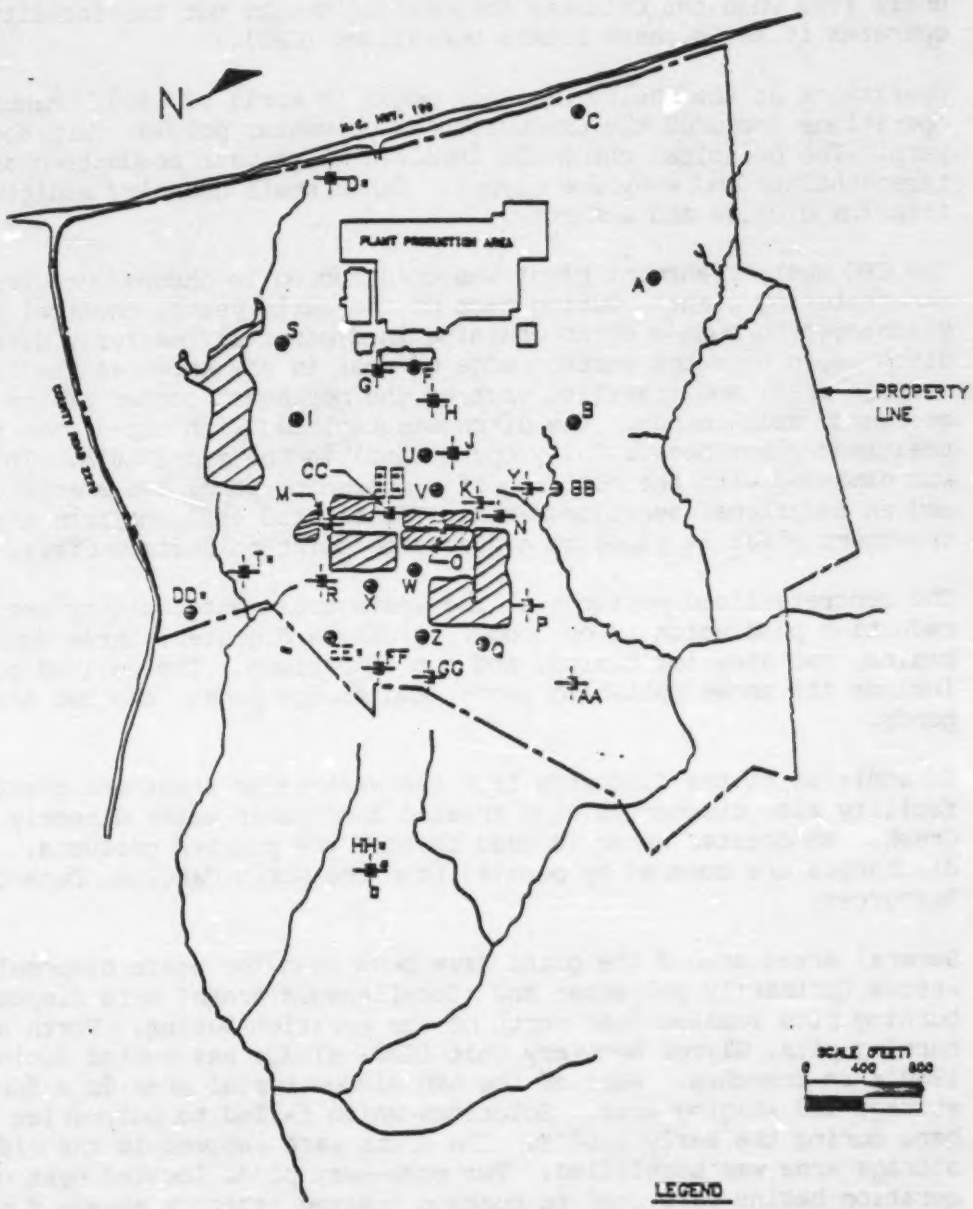
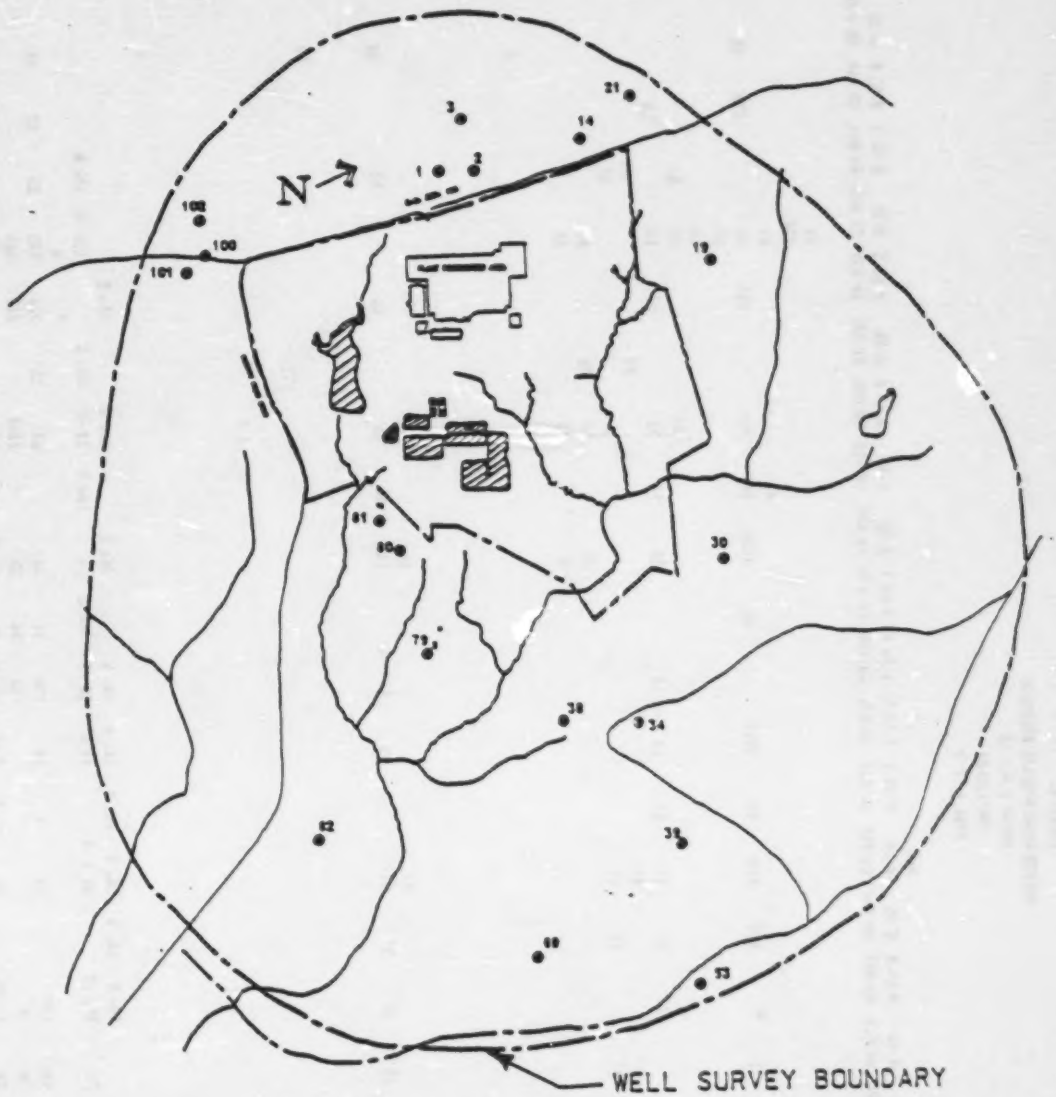


Figure 3-1

FIGURE
MONITOR WELL
LOCATION MAP
CFO / SHELBY, N.C.



WELL NO.	OWNER
1	LAKE MURRAY PLASTICS, INC.
2	MOORE T. PARK
3	GRAHAM & MOORE T. PARK
14	KAY COBB (GENE BETTIS)
19	BOB DOVER
21	B. OF ED. NO. 3 SCHOOL
30	JOE HOPSON
34	WINFORD OLIVER
38	CLAUDE OLIVER
39	MAX LONG
53	HARVEY LEE TOM
69	LINDA HART
79	JAMES ROBERT ELLIOTT
80	LARRY STEIN
81	JACKIE LAMBERT
82	CHILDREN'S HOME
100	BESS W. LAVENDER
101	NEW HOPE BAPTIST CHURCH
102	CLAUDE LAVENDER

LEGEND

69● SAMPLED WELL LOCATION

SCALE (FEET)
0 700 1400

Figure 3-2

FIGURE
OFFSITE WELL LOCATION MAP
CFO / SHELBY, N.C.

TABLE 3-1

ONSITE GROUND WATER ANALYSIS
PHASE I RI/FS
CEO/EMERY
PAGE 1 OF 2

	A-39 GW-021	B-34.5 GW-028	C-49 GW-016	D-35 GW-019	F-55 GW-026	G-50 GW-023	G-80.5 GW-022	H-59 GW-026	DUP H-59 GW-051	H-79.5 GW-027	I-57.5 GW-025	J-29.5 GW-030	J-59.5 GW-031	K-20 GW-033	K-50 GW-034	M-44.5 GW-040	N-29 GW-036	N-53.5 GW-035	O-25 GW-043	O-50.5 GW-042	P-31.5 GW-050	Q-33 GW-049
VOLATILE COMPOUNDS (ug/L)																						
CHLOROMETHANE																		13				
CHLOROETHANE																		177				
METHYLENE CHLORIDE																		16				
ACETONE																		88				
1,1-DICHLOROETHENE	1250	50	3240		1361	17	-	620	619	95	2150		48	1090	43		705	10		156	66	
1,1-DICHLOROETHANE															202	916		10				
TRANS-1,2-DICHLOROETHENE																		18				
CHLOROFORM																		58	6			
2-BUTANONE	13		13												88			63		13		
TRICHLOROETHENE			63			13	33	33	43	13	63			50	58		13		119			
BENZENE								63							7			26				
TOLUENE				8	33		63	63					25		33	63		14	33			
CHLOROBENZENE													6		23							
CARBON TETRACHLORIDE															23							
SEMIVOLATILE COMPOUNDS (ug/L)																						
DIBENZOFURAN				14																		
PHENANTHRENE				15																	1	
DI-N-BUTYLPHTHALATE	20		16	12																		
BIS(2-ETHYLHEXYL)PHTHALATE	25		67	52	18	50	57	12														
ANTHRACENE	30							59		60	35		60									
CHRYSENE	13												132	44	15		16		13		12	
BIS(2-CHLOROISOPROPYL)ETHER																					13	
PESTICIDE/PCB COMPOUNDS (ug/L)																						
GAMMA-BHC(LINDANE)																						
DIELDRIN																						
TOXAPHENE																						
CHLORDANE	0.5														1.7							
METALS (ug/L)																						
ANTIMONY																						
ARSENIC	10u B	10u B	10u B		10u B																	
BERYLLIUM	10u B	10.8 +B	10u B	10u B	10u B	21	10u B	10u B	10u B	10u B	10u B	10u B										
CHROMIUM							10u +B		31.3 +B													
COPPER	56	102	25	31						11.6	38 +B	50u B			10u B							
LEAD		26				102	128						10u B	10u B	23 +B	10u B						
NICKEL	5u B	33 +B	5u B	5u B		30	60	11	34	38	198	44					10u B					
SELENIUM		50				26	33 +B				163	44	70		67	18		6				
THALLIUM	5u B	25u EE	5u B	5u B		120	70	10	5u B	9 BE	60 BE	25	35		1211		9	130 +B	10u B			
ZINC	10u B	10u B	10u B	10u B	5u B		25u B				120	50	16 BE	5u B	17		778	185				
	52	66	87	93	10u B	10u B	10u B	5u B	25u B	5u B	25u B	25u B	160		60		629	165	22	67	32	
					30	164	58		10u B	10u B	10u B	10u B	25u EE	5u B	5u B	5u B						
INDICATORS										10u B	259	82		10u B		10u B	710	129 +B	5u B	5u B	30 BE	
TOC (mg/L)									26	32			107	23	118	36	25u B	620				
pH	3.7	11.8	3.7	3.0	3.2	3.2	2.5	5.2	40.2	6.0	160	6.0	6360	8.0	23.0	14.5	10u B	25u B	25u B	5u B	5u B	
CONDUCTIVITY (umhos/cm)	5.63	6.38	5.93	5.28	6.26	5.73	6.05	6.04	6.26	6.23	6,68	6.73	5.93	6.99	5.37	6.66	1620	10u B	10u B	20	20	
	56	560	19	60	30	175	56	25	28	23	2150	165	5630	307	111	60	2.7	360	29	30	62	
																	6.93	38	8.2	11.6	13.0	
																	107	6.68	7.11	6.38	5.16	
																		1035	135	805	505	

Notes:

- BOA[illegible]ysis results are from the resampling effort of 6/7/86.
- Exc[illegible] GW-041 was from a dry well (B-28).
- VOA analysis for CEO GW-040 was lost.

TABLE 3-1

ONSITE GROUND WATER ANALYSIS
PHASE I AND II
CFO/SAALTOS
PAGE 1 OF 2

	B-17 GB-045	B-42.5 GB-044	B 50 GB-020	T-17 GB-030	U 30.6 GB-029	U-23.6 GB-032	U 23.3 GB-047	U 32.9 GB-046	U 30.8 GB-038	U-24.6 GB-037	U-20.6 GB-048
VOLATILE COMPOUNDS (ug/L)											
CHLOROMETHANE											
CHLOROETHANE											
METHYLENE CHLORIDE				17					14		
ACETONE	63	1430	1100 J		61		110	82	341	631	
1,1-DICHLOROETHENE											
1,1-DICHLOROETHANE											
TRANS-1,2-DICHLOROETHENE				28							
CHLOROFORM	13	13		76		50	50	13	60	33	
2-BUTANONE											
TRICHLOROETHENE											
BENZENE				6			33			6	
TOLUENE							23				
CHLOROBENZENE				63							
SEMIVOLATILE COMPOUNDS (ug/L)											
DIBENZOFURAN											
N NITROSODIPHENYLAMINE(1)											
DI-N BUTYLPHTHALATE		29	33								
BIS(2 ETHYLHEXYL)PHTHALATE		13	32			185		12	16		
ANTHRACENE				26							
CAPTACAN											
BUTYLBENZYLPHTHALATE											
PESTICIDE/PCB COMPOUNDS (ug/L)											
GAMMA-HEXACHLORANE											
DIELDRIN						3.2					
HEXACHLORE				0.5							
METALS (ug/L)											
ANTIMONY		16a B	16a B			16a B	16a B				171 +B
ARSENIC	150 B	16a B	36	138 +B	13.6 BE	16a B	22	16a B	16a B	16a B	
BERYLLIUM	11			10							9
CALCIUM	306	34	80	156	85	66	60	39		22	312
COPPER	143			56	77	36					262
LEAD	733 +B	5a B	13 BE	340 +B	190 +B	26	7.5		5a B	5a B	119 BE
NICKEL	510			250	86	650	70				260
SELENIUM	25a BE		25a B	25a B	25a B	25a BE	25a B	5a B	5a B	5a B	25a B
THALLIUM	10a B	10a B	10a B	10a B	10a B		50a BE	50a B	10a B	50a BE	10a B
ZINC	310	63	66	252	199	185	66			20	675
INDICATORS											
TOC (mg/L)	6.5	5.2	2.7	10.2	6.5	3160	8.0	2.5	3.0	2.8	3.0
pH	5.84	5.95	10.30	5.10	5.40	5.76	5.84	7.36	11.66	6.51	5.97
CONDUCTIVITY (mhos/cm)	222	313	165	361	26	6850 J	351	116	1369	76	65

Notes:
- 90A analysis results are from the resampling effort of 6/7/86.
- Sample CFO GB-041 was from a dry well (B-28)
- 90A analysis for CFO GB 048 was lost.
- pH and conductivities are averages from Phase I and II.

TABLE 3-1

OFFSITE GROUND-WATER ANALYSIS
PHASE I AND IA
CFO/SHELBY
PAGE 1 OF 1

	Claude Lavender GW-001	Murray Plastics GW-002	G.Moore T.Park GW-003 (Shallow)	G.Moore T.Park GW-004 (Deep)	Ray Cobb GW-005	No. 3 School GW-006	Bob Dover GW-007	Joe Hopson GW-008	Winfred Oliver GW-009	Max Long GW-010	Claude Oliver GW-011	James Elliott GW-012	Dup of Elliott GW-055 (GW-012)	Larry Stein GW-013	Jackie Lambert GW-014	Children Home GW-015	Rose Lavender GW-016	New Hope Baptist GW-017	Linda Hart GW-154	Harvey Tom GW-155
VOLATILE COMPOUNDS (ug/L)																				
METHYLENE CHLORIDE																				
ACETONE							680			967										
CHLOROFORM	48						111			61	79			31		14				
2-BUTANONE							21		7	22					43	43			43	43
TRICHLOROETHENE									53					93						
TOLUENE												13								
VINYL ACETATE							15			17			23							
BENZENE															33				23	13
SEMIVOLATILE COMPOUNDS (ug/L)																				13
DI-N-BUTYLPHTHALATE							11	83		17	10	24	24			32		11		
BIS(2-ETHYLHEXYL)PHTHALATE				15			13	39		34		25	35			16	15			440
DI-N-OCTYLPHTHALATE								12												
METALS (ug/L)																				
ANTIMONY	10uB		10uB	10uB									10uB			10uB				
ARSENIC		43*B		128*B	10uB	10uB	10uB	10uB	10uB		50uB	10uB	10uB				10uB	10uB	10uSB	10uSB
CHROMIUM	16								14			13	14						10u*B	37.1*B
COPPER		200			170	26			46	27		36	54							
SELENIUM	5uB	5uB	5uB	5uB	5uB		5uB	25uB	5uB	5uB	5uB	25uB	25uB	5uB - 5uB	5uB	5uB	5uB	5uB	5uB	49
LEAD	5uB		5uB		5uB	5uB		25uB	25uB	5uB		5uB			5uB	5uB			5uS*	5uS*
THALLIUM	10uB	10uB	10uB	10uB	50uEB	50uEB	50uB	10uB	10uB	10uB	10uB	10uB	10uB	209	50uB	10uB	10uB	10uB	10uSB	10uSB
ZINC	161	62	240	80		97	20				78				53	48	30			150
INDICATORS																				
TOC (mg/L)	1.7	1.5	3.9	2.3	2.0	2.0	2.0	2.3	2.0	2.0	1.5	2.0	1.7	2.5	2.0	1.7	2.3	1.2	1.8	1.6
pH	7.06	7.36	6.55	7.13	5.43	7.06	6.41	6.51	7.40	6.27	7.35	7.26	7.26	7.58	7.60	6.36	6.82	7.66	7.82	7.87
CONDUCTIVITY (umhos/cm)	103	72	499	125	34	40	42	66	65	59	66	69	69	65	60	126	134	122	67	127

Notes:

- VOC analysis results are from the resampling effort of 4/7/86.
- The CFO-GW-155 of 4/12/86 VOC results are the duplicate results for CFO-GW-112 (Elliott). The remaining CFO-GW-155 analyses of 4/19/86 and 4/22/86 are the results for Harvey Lee Tom.
- pH and conductivities are averages for Phase I and Phase IA.

TABLE 3-1

ONSITE GROUND[illegible] ANALYSIS
PRE-
CEO/SHELBY
PAGE 1 OF 4

	A-39 GW-182	B-34.5 GW-193	C-49 GW-184	D-27.5 GW-164	D-35 GW-183	D-56.2 GW-157	D-80 GW-165	E-57.5 GW-166	F-31.5 GW-191	F-58.5 GW-146	G-33 GW-150	G-17 GW-188	G-50 GW-185	I-17 GW-187	I-35.1 GW-167	I-50.5 GW-169	I-80.0 GW-192	J-70.6 GW-189	AA-41 GW-159	AA-54 GW-158
VOLATILE COMPOUNDS (ug/L)																				
CHLOROMETHANE															12					
BROMOMETHANE															83					
VINYL CHLORIDE															10					
CHLOROETHANE															11					
METHYLENE CHLORIDE		43								8.2			43	18.2	49		13	36.8	8.9	
ACETONE	239	18						489.8	93	263.3	86	32	135		153	135	121	1185.5	8	
CARBON DISULFIDE															9					
1,1-DICHLOROETHENE															9					
1,1-DICHLOROETHANE									43					6.43	12					
TRANS-1,2-DICHLOROETHENE														34.5	33					
CHLOROFORM	48	48	58	58	48	48	48	48	58	58	58	58	48	72.9	107	58	85	58	68	58
1,2-DICHLOROETHANE														11.9	20					
2-BUTANONE									43					5.43	11					
1,1,1-TRICHLOROETHANE															10					
CARBON TETRACHLORIDE															11					
BROMODICHLOROMETHANE															9					
1,2-DICHLOROPROPANE															9					
TRANS-1,3-DICHLOROPROPENE															7					
TRICHLOROETHENE														2.53	15					
DIBROMOCHLOROMETHANE															9					
1,1,2-TRICHLOROETHANE															9					
BENZENE														8.3	20					
CIS-1,3-DICHLOROPROPENE															7					
2-CHLOROETHYLVINYLETHER															23					
BROMOFORM															6					
TETRACHLOROETHENE															10					
1,1,2,2-TETRACHLOROETHANE															8					
TOLUENE															11					
CHLOROBENZENE														8.1	16					
ETHYLBENZENE															9					
STYRENE															8					
SEMIVOLATILE COMPOUNDS (ug/L)																				
PHENOL				23											13	23				
1,2-DICHLOROBENZENE																				
NITROBENZENE							23													
BENZOIC ACID							13								13					
NAPHTHALENE																			13	
4-CHLOROANILINE																				
HEXACHLOROBUTADIENE																				
4-NITROANILINE																				
N-NITROSODIPHENYLAMINE(1)															23					
DI-N-BUTYLPHTHALATE				13											53	53				
BIS(2-ETHYLHEXYL)PHTHALATE						58				57					82	18				33

TABLE 3-1

ONSITE GROUND-WATER ANALYSIS
PHASE II
CEO/SHELBY
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	A-39 GW 102	B-34.5 GW-193	C-49 GW-184	D-27.5 GW-164	D-35 GW-183	D 56.2 GW-157	D-68 GW-165	E 57.5 GW-186	P-31.5 GW 191	P 58.5 GW-166	G-33 GW-154	H-17 GW-188	H-50 GW-185	I-17 GW-187	I-35.1 GW-167	I-50.5 GW-169	J-30.8 GW-192	J-70.4 GW-189	AA-41 GW-159	AA 58 GW 156
METALS (ug/L)																				
ANTIMONY				10u•																
ARSENIC				56u•B		10u•B	10.4•B			10u•B					10u•B	10u•B			100u•B	20.4•B
BERYLLIUM																				6
CADMIUM																				
CHROMIUM	29	53	43	123	32		61	22	245		36	299	27	52		34	103	73	53	115
COPPER				25																46
LEAD				93.8B		5.2B	29.2B			5uSB					5uSB	23.5SB			665SB	90.3•B
NICKEL				74			39		150			560		60		64		80	50	66
SELENIUM				32.5SB		5uSB	5uSB			5uSB					5u•B	5u•B			5u•B	5u•B
THALLIUM				10u•B		10uSB	10uSB			10u•B					10uSB	10uSB			10u•B	10u•B
ZINC				55•		20•	100•			29					30	42			185	396
INDICATORS																				
TOC (ug/L)	13.5	13.2	8.5	5.5	12.8	8.0	11.0	9.6	11.0	12.6	12.0	6.0	17.0	11.0	11.5	3.5	13.5	6.9	5.0	5.5
CONDUCTIVITY (umhos/cm)	93.5	720	20	500	67	40	120	22	917	900	670	215	93	360	677	230	2183	137	223	242
pH	7.95	6.75	6.96	6.95	6.73	7.17	8.92	7.45	6.20	7.15	6.60	6.70	10.20	6.93	6.62	7.16	11.72	6.20	5.09	5.40
SOUTHERN (ug/L)									23		13	13		123	63	88				28

ONSITE GROUND WATER ANALYSIS
PHASE II
CEO/SHELBY
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	BB 10.5 GW-162	CC-33 GW-163	CC 64 GW-160	DD-58 GW-175	EE-58 GW 161	FF-23.6 GW-172	FF-34.5 GW-171	FF-62.4 GW-168	GG-25.8 GW-173	GG-39 GW-170	GG-61 GW-174	HH-48 GW-177	HH-77.4 GW-176	DUPE HH-77 GW-181
VOLATILE COMPOUNDS (ug/L)														
CHLOROMETHANE								256.3						
BROMOMETHANE								127.9						
VINYL CHLORIDE														
CHLOROETHANE														
METHYLENE CHLORIDE		12		10.5										
ACETONE	53	376	115	523.9	63.6	5.43	513.3	798.6	10.5		19.2	73	69	29
CARBON DISULFIDE		30												
1,1-DICHLOROETHENE														
1,1-DICHLOROETHANE														
TRANS-1,2-DICHLOROETHENE														
CHLOROFORM	68	191	58	58	68	68	68		68	68	68	58	68	58
1,2-DICHLOROETHANE														
2-BUTANONE		89	63											
1,1,1-TRICHLOROETHANE														
CARBON TETRACHLORIDE														
BROMODICHLOROMETHANE														
1,2 DICHLOROPROPANE														
TRANS-1,3-DICHLOROPROPENE														
TRICHLOROETHENE												36		
DIBROMOCHLOROMETHANE														
1,1,2 TRICHLOROETHANE														
BENZENE		53												
CIS-1,3 DICHLOROPROPENE														
2-CHLOROETHYLVINYLETHER														
BROMOFORM														
TETRACHLOROETHENE														
1,1,2,2-TETRACHLOROETHANE														
TOLUENE														
CHLOROBENZENE		12												
ETHYLBENZENE														
XYLENE														
SEMIVOLATILE COMPOUNDS (ug/L)														
PHENOL		22												
1,2-DICHLOROBENZENE		73												
NITROBENZENE		53												
BENZOIC ACID				23							13	13		
NAPHTHALENE		13												
4-CHLOROANILINE														
HEXACHLOROBUTADIENE		73												
4 NITROANILINE					412		412							
N NITROSODIPHENYLAMINE(1)														
DI-N-BUTYLPHTHALATE		23	43	23								93	13	
BIS(2-ETHYLHEXYL)PHTHALATE			109	304	53	33		17		13	13	68	63	141

TABLE 3-1

ONSITE GROUND-WATER ANALYSIS
PHASE II
CEU/SHELBY
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	BB-10.5 GW-162	CC-33 GW-163	CC-66 GW-160	DD-58 GW-175	EE 58 GW 161	FF-23.6 GW 172	FF-36.5 GW-171	FF-62.4 GW-168	GG-25.8 GW 173	GG 39 GW 170	GG 61 GW 176	HH-48 GW-177	HH-77.4 GW-176	DUPE HH-77 GW-181
METALS (ug/L)														
ANTIMONY	10u•		610.61S			10u•				10u•		10u•		
ARSENIC	50u•B	326•B	10uSB	10u•B	10u•	10u•		10u•	1535	10u•	10u•	100u•B	10u•B	10u•B
BERYLLIUM		10							B			B		
CADMIUM		7												
CHROMIUM	78	616	34		44	40	84	16	198	48		255		
COPPER	70	777		27	28				75			86	6261	29
LEAD	62.5S	1041SB	15.65B	16.75B	59.75•B	67.95•B	27.65•B	29.65•B	955•B	265•B	525•B	166•B	16.75B	5.75B
NICKEL	74	374		64			48		272	42		86		
SELENIUM	5uSB	25u•B	5uSB	5uSB	5uSB	5uSB	5uSB	5u•B	5u•B	5uSB	5uSB	5u•B	5uSB	5u•B
THALLIUM	10u•B	50uSB	10uSB	10u•B		10u•	10u•	10u•			10u•	10u•B	10uSB	10uSB
ZINC	160•	236	75	48	99	81	37	74	210	70	40	435	34	30
INDICATORS														
TOC (ug/L)	6.0	300	10.0	35.5	12.0	5.2	6.0	19.5	11.0	6.0	8.6	26.5	60.5	62.0
CONDUCTIVITY (umhos/cm)	173	820	65	155	143	79	215	111	1350	85	113	75	160	160
pH	6.30	6.93	5.85	7.24	6.67	6.95	9.89	7.10	6.75	6.93	5.70	6.10	6.70	6.70
BOUTHERN (ug/L:		33			13									

TABLE 3-1

ONSITE GROUND-WATER ANALYSES
PHASE IIA
CFO/SHELBY
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	C-49 GW-226	D-27.5 GW-203	D-35 GW-223	D-56.2 GW-202	D-80 GW-204	P-31.5 GW-212	P-50.5 GW-211	T-17 GW-215	T-35.1 GW-213	T-50.5 GW-214	AA-41 GW-205	AA-56 GW-206	BB-10.5 GW-210	CC-33 GW-208	CC-64 GW-207	DD-50 GW-219	EE-50 GW-209	FF-23.6 GW-226	FF-34.5 GW-225
VOLATILE COMPOUNDS (ug/L)																			
VINYL CHLORIDE								13											
METHYLENE CHLORIDE			1				13	163	343					15			85		
ACETONE	23		1583				632	183		350	28			664	69		164		
CARBON DISULFIDE														32					
CHLOROFORM		23	23					713	1203	23				237					
2 BUTANONE										83				95					
CARBON TETRACHLORIDE														760					
BENZENE								73	13					60					
4 METHYL-2-PENTANONE		13	13	63		13		13	13	13	13	13		3		13	13		
TOLUENE		23					73	113						9	6		6		
CHLOROBENZENE								103						12					
TRICHLOROETHENE								23											
TRANS-1,2 DICHLOROETHANE								313	223										
1,2 DICHLOROETHANE									123										
2-HEXANONE																			
SEMIVOLATILE COMPOUNDS (ug/L)																			
PHENOL						63		13	33			23	63	41		13	13		13
2-CHLOROPHENOL														23					
1,3-DICHLOROBENZENE				13	13			13	23	13						13			
1,4-DICHLOROBENZENE				13	13			33	23	13				33		13			
1,2-DICHLOROBENZENE									23					10					
2 METHYLPHENOL														13					
NITROBENZENE														53					
BENZOIC ACID						13					23	13		133	13	13			
BIS(2-CHLOROETHOXY)METHANE														93					
NAPHTHALENE														23					
4 CHLORO-3-METHYLPHENOL														83					
2-METHYLNAPHTHALENE							13												
2-NITROANILINE							13		23					83					
ACENAPHTHENE																			
4-NITROPHENOL							73		23						103		13		
2,4-DINITROTOLUENE											13			23					
DIETHYLPHTHALATE									13										
4-NITROANILINE							23								13				
3-NITROANILINE														13					
DI-N-BUTYLPHTHALATE		53	53	33	63	33	23	63	63	63	33			63	53	63	13	23	33
BUTYLBENZYLPHTHALATE																	11		
BIS(2-ETHYLHEXYL)PHTHALATE	50	93	46	99	14	12	51	13	30	148	16		63	33	65	33		83	38

TABLE 3-1

OFFSITE GROUND-WATER ANALYSIS
PHASE IIA
CFO/SHELBY
PAGE 2 OF 4

	C-49 GW 226	D-27.5 GW-203	D-35 GW-223	D-56.2 GW-202	D-60 GW-204	P-31.5 GW-212	P-58.5 GW-211	T-17 GW 215	T-35.1 GW 213	T-58.5 GW 216	AA-61 GW 205	AA-56 GW-206	BB-18.5 GW-210	CC-33 GW-208	CC-66 GW-207	DD-58 GW-219	EE-58 GW-209	FF-23.6 GW-226	FF-34.5 GW-225
METALS (ug/L)																			
ANTIMONY	10uSB		10u•		10u•	10u•B	10u•B	10u•B	10u•B	10uSB	10u•B	10uSB	10u•B	10u•B	10uSB	10u•B	10u•B	10u•B	10uSB
ARSENIC	10u•	12.3•	10u•	10u•	21.9•	33.8•B	10u•B	24.15	10u•	10u•	10u•B	10uSB	10u•B	10u•B	10u•B		10u•B	10u•	10u•
BERYLLIUM																			
CHROMIUM		36			39	157•	12	76	61		19	36	23	85	17	26	34	26	117
COPPER				(20)		60		21	30		(23)	26	(21)	450		(23)	(26)		52
LEAD	8.6S	25uSB	29.65B	10.55B	10.65B	60.95B	10.95B	47•	26.85		10uSB	62.5•B	9.35B	1160SB	10.0 SB	22.65	75B	27.85	62.55
MERCURY																			
NICKEL					69	125		95	107			66		247		51			96
SELENIUM	5uSB	5u•				5u•	5u•	5uSB	5uSB	5uSB	5u•	5u•		5u•	5u•	5uSB		5u•B	
THALLIUM		10u•	10u•			10uSB	10uSB	10u•			10u•B	10uSB	10uSB	10uSB	10uSB		10uSB	10u•	5uSB
ZINC	34	91	118		57	137		171	80		213	110	66	1687	41	31	71	56	321
INDICATORS																			
TOC (ug/L)	12.1	5.5	9.2	6.8	3.5	15.0	27.5	10.9	27.9	37.5	3.5	12.0	3.1	238	6.5	10.1	14.0	6.5	3.0
CONDUCTIVITY (umhos/cm)	20	577	60	61	123	600	360	NA	NA	NA	122	103	82	700	50	155	71	65	107
pH	7.65	6.83	6.32	6.93	8.33	7.23	7.50	6.42	5.90	6.32	5.35	6.70	5.05	6.90	6.12	7.13	7.81	8.35	9.32
BOUTREUX (ug/L)							43	260	208					53		13			

Notes:

- NA for conductivity means not analyzed due to the meter being unavailable.

TABLE 3-1

ONSITE GROUND WATER ANALYSIS
PHASE IIA
CEO/SHELBY
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	EF-62.6 GW-227	GG 25.8 GW-217	GG-39 GW-216	GG 61 GW-218	AA-60 GW-221	DUP AA-60 GW-222	BB-77.6 GW-220
VOLATILE COMPOUNDS (ug/L)							
VINYL CHLORIDE							
METHYLENE CHLORIDE				63			
ACETONE		33					20753
CARBON DISULFIDE							
CHLOROFORM							23
2-BUTANONE							
CARBON TETRACHLORIDE							
BENZENE							
4-METHYL-2-PENTANONE					63		33
TOLUENE							
CHLOROBENZENE							
TRICHLOROETHENE					26	26	
TRANS-1,2-DICHLOROETHANE							
1,2-DICHLOROETHANE							
2-HEXANONE					103		
SEMIVOLATILE COMPOUNDS (ug/L)							
PHENOL							
2-CHLOROPHENOL							
1,3-DICHLOROBENZENE							33
1,4-DICHLOROBENZENE							33
1,2-DICHLOROBENZENE							
2-METHYLPHENOL							
NITROBENZENE							
BENZOIC ACID							
BIS(-2-CHLOROETHOXY)METHANE							
NAPHTHALENE							
4-CHLORO-3-METHYLPHENOL							
2-METHYLNAPHTHALENE							
2-NITROANILINE							
ACENAPHTHENE							
4-NITROPHENOL							
2,4-DINITROTOLUENE							
DIETHYLPHTHALATE							
4-NITROANILINE							
3-NITROANILINE							
DI-N-BUTYLPHTHALATE	43		23		33	33	33
BUTYLBENZYLPHTHALATE				33			
BIS(2-ETHYLHEXYL)PHTHALATE	240	43	93		83	83	42

TABLE 3-1

ONSITE GROUND-WATER ANALYSIS
PHASE IIA
CEO/SHELBY
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	FF-62.4 GW-227	GG-25.8 GW-217	GG-39 GW-216	GG-61 GW-218	HH-48 GW-221	DUP HH-48 GW-222	HH-77.4 GW-220
METALS (ug/L)							
ANTIMONY	10u*B	50u*B	10u*B	10u*B	10u*		10u*
ARSENIC		50u*B	10u*B	10u*B	10u*	10u*	
BERYLLIUM		12	6				
CHROMIUM		106	119		69	46	
COPPER		65	81		31	26	
LEAD	27.6B	112SB	56.1SB	12.4SB	74.9SB	47.7SB	7.6SB
MERCURY			0.7				
NICKEL		217	108		50	45	
SELENIUM	5u*B	5u*		5u*	10*		
THALLIUM		10uSB	10uSB	10uSB		10u*	
ZINC	20	267	246	24	333	257	
INDICATORS							
TOC (mg/L)	11.0	3.0	5.0	5.0	12.0	10.0	17.5
CONDUCTIVITY (umhos/cm)	193	130	77	95	52	52	90
pH	7.63	6.93	5.57	5.20	8.00	8.00	7.75
SOUTHERN (ug/L)							

Notes:

- NA for conductivity means not analyzed due to the water being unavailable.

TABLE 3-1

OFFSITE VOC GROUND-WATER ANALYSIS
PHASE II
CFO/SHELBY
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	B. Dover WELL 19 GW 197-1	B. Dover WELL 19 GW-197-2	H. Oliver WELL 36 GW-201-1	H. Oliver WELL 36 GW-201-2	C. Oliver WELL 38 GW-200-1	C. Oliver WELL 38 GW-200-2	Max Long WELL 39 GW 196-1	Max Long WELL 39 GW 196-2	Linda Hart WELL 69 GW-156-1	Linda Hart WELL 69 GW 156-2	J. Elliott WELL 79 GW 198-1	J. Elliott WELL 79 GW-198-2	L. Stein WELL 80 GW-199-1	L. Stein WELL 80 GW-199-2
VOLATILE COMPOUNDS (ug/L)														
ACETONE				5J			12					5J		
TRICHLOROETHENE											1J	1J		
4 METHYL 2-PENTANONE							7J							
2 HEXANONE							6J							
INDICATORS														
pH	7.29	7.29	6.48	6.48	7.08	7.08	6.55	6.55	7.72	7 72	7.03	7.03	7.41	7.41
CONDUCTIVITY (umhos/cm)	55	55	80	80	106	106	77	77	70	70	72	72	62	62

Notes:
- J indicates a value which was below the quantification value and is, therefore, an estimated value.

blocks and steel strapping bands. Approximately 21 acres of the northwest quadrant of the property have been issued permits by the North Carolina Department of Natural Resources for sludge disposal since 1978.

In the period from 1970 to 1978, approximately 2000 to 3000 drums of waste chemicals and solvents, including lab packs, were stored temporarily in the area known as the drum storage area near the former burning pits. All drums were removed from the area by 1978 and sent to outside disposal facilities.

Investigation of the Celanese Fibers Operations Site began in October 1981 when CFO contracted with the firm Soil & Material Engineers, Inc. (S&ME) to install 23 groundwater monitor wells. In conjunction with the groundwater monitor well installation program, SME also conducted a hydrogeologic evaluation. Subsequently, CFO initiated a groundwater sampling and analysis program under the supervision of Davis & Floyd Laboratories, Inc.

Soil & Material Engineers, Inc. also conducted an electromagnetic survey and excavated test pits at the site.

In October 1984, CFO was proposed for EPA's National Priorities List. Also in October 1984, there were a series of meetings between the U. S. Environmental Protection Agency (EPA) and CFO to discuss the preparation of a Work Plan for a Remedial Investigation (RI) and Feasibility Study (FS) by CFO's contractor, S&ME. Concurrent with this, EPA's contractor, Camp Dresser & McKee, Inc.(CDM), prepared a report that included a review of the data collected during previous site investigations and identified information deficiencies and data gaps to provide a basis for development of Remedial Investigation activities. These events resulted in the submission of a draft Work Plan by S&ME, on behalf of CFO, with a final Work Plan submitted to EPA in November 1985.

3.0 Groundwater Contaminants

On-Site Monitor Wells

The monitor wells (Figure 3-1) existing at the start of the RI were sampled as the initial field operation (Phase I and IA). Select monitor wells from this group and the monitor wells installed during the RI were sampled during the Phase II and IIA events. The Phase II and IIA wells were generally in background locations and near the site's perimeter to provide data on the groundwater quality as it entered and exited the site.

Analyses of these samples showed varying results between the two sampling periods, with variations occurring in both compounds identified and concentrations of the same compound in one well on separate dates. Due to the variation in data, and the location of wells selected for analysis (typically on or near the plant's perimeter), mappable trends in groundwater quality were not identified. However, the data show that compounds similar to those identified in the probable source area were detected in the groundwater. These include phthalates (concentrations to 380 ug/l), ketones (concentrations to 2100 ug/l), benzene (concentrations to 60 ug/l) and other non-phenolic aromatic compounds, and members of the chlorinated ethene/ethane groups

(concentrations to 90 ug/l). Of these groupings, members of the phthalate and ketone groups were measured more frequently and at higher concentrations.

Examination of the groundwater quality data shows that the deeper wells in the nests frequently have the higher concentration of organic compounds, suggesting introduction of the compounds to the groundwater in a recharge zone or through the relic fracture system in the saprolite. Figures 3-1 and 3-2 show the locations of on and off-site monitor wells used in this analysis. Table 3-1 summarizes the groundwater quality data.

Monitor wells in the waste-water treatment plant area and the western terrace of the lawn, however, generally have higher concentrations of contaminants in the shallow wells. This is apparently due to the wells' locations within or near the probable source areas. Groundwater quality data for monitor wells J, CC, 0, and K within the probable source area most clearly indicates this occurrence.

Elevated chromium levels were reported at several on-site monitor wells during the Phase II and IIA sampling events. It appears that plant operations have contributed to the chromium potential, however, naturally occurring chromium in the soil and rock are also possible sources.

Groundwater contamination is predominantly in the area underlying the western terrace of the lawn and wastewater treatment plant based on the analytical sampling results. However, there are volatiles, semi-volatiles and metals which appear to trend from this area to the south-southeast toward monitor well nest T, and are reported at other areas on certain sampling events.

Off-Site Monitor Wells and Supply Wells

Groundwater quality was measured at 19 off-site locations shown on Figure 3-2, during the Phase I and IA groundwater sampling episodes. Concentrations of volatile organic compounds (VOCs) were measured in seven of the off-site wells during the Phase II groundwater sampling episodes. Phase II sampling consisted of re-sampling seven of the wells showing higher concentrations of VOCs.

During Phase I sampling, phthalate compounds were detected in eleven of the off-site wells at concentrations typically ranging between 10 and 40 ug/l. Exceptions were the Hopson and Tom wells which reported di-N-butyl phthalate at 83 ug/l and bis(2-ethylhexyl) phthalate at 440 ug/l, respectively. None of the phthalate compounds detected exceeded EPA water quality criteria.

Comparison of Volatile Organic Compound (VOC) analysis for both sampling episodes showed inconsistencies in both detected compounds and concentrations. Phase I detected Hazardous Substance List (HSL) VOCs in 11 of the 19 wells sampled at concentrations generally less than 80 ug/l. Exceptions were noted at the Dover well where methylene chloride and acetone were reported at 680 ug/l and 111 ug/l, respectively, and at the Long well where methylene chloride was reported at 967 ug/l. The phase II sampling detected VOCs in four of the seven wells in concentrations ranging from 5 to 14 ug/l. With the exception of James Elliott's well, which consistently detected trichloroethene (TCE), no HSL volatile organic compounds were detected during Phase II above proposed or existing standards.

4.0 Discussion of Cleanup Criteria (ARARs)

Safe Drinking Water Act Maximum Contaminant Levels (MCLs) are the Applicable or Relevant and Appropriate Standards (ARARs) for groundwater at the federal level. In a project meeting April 16, 1987, EPA indicated they would probably defer to state criteria when more stringent than federal. Maximum contaminant levels were established by the State of North Carolina as given in 15 NCAC 2L. These amendments established more stringent criteria for some compounds with federal MCLs and add 46 additional compounds. For the purposes of this document, the North Carolina criteria are considered the ARARs for groundwater. In discussions with personnel of the North Carolina Division of Environmental Management, they have indicated that specific requests may be needed for compounds for which standards have not been set.

Comparison of Groundwater to ARARs

The water quality standards for North Carolina groundwater were adopted from the Environmental Protection Agency Standards.

The groundwater quality documented during the RI indicated that the following parameters exceeded the standard in at least one monitor well during sampling Phase II or IIA.

Substances	Total No. of Occurrences Above Existing or Proposed Standards
* 1,1-dichloroethene	1
* 1,1-dichloroethane	2
* trans-1,2-dichlorothene	1
* benzene	10
* methylene chloride	17
* vinyl chloride	1
* chloroform	9
* chlorobenzene	5
* carbon tetrachloride	2

Substances	Total No. of Occurrences Above Existing or Proposed Standards
o phenols	2
o tetrachoroethylene	1
o chlordane	2
o chromium	40
o barium	2
o iron	4
o manganese	4
o nickel	13
o selenium	1
o chloromethane	2

The majority of the compounds, detected during the RI above the standard, occurred in wells located in the vicinity of the wastewater treatment area, predominantly in monitor well nest CC, and in the monitor well nest at location T south southeast of this area.

5.0 Summary of Public Health Evaluation

A suite of indicator parameters was chosen, according to the guidelines put forth in the Superfund Public Health Evaluation Manual (EPA, 1986), for toxological interpretations and review purposes. Generally, this process directs the selection of chemicals which best represent the hazards associated with the site based on concentration in the environmental medium of concern and a relative toxicity constant. Application of this process, which is discussed in detail in the Public Health Assessment in Appendix A of the FS report, resulted in the selection of benzene, trichloroethylene (TCE), bis(2-ethylhexyl) phthalate, lead, and chromium as the indicator chemicals. These were developed by considering the primary routes of exposure as groundwater and contact with surface and near surface soils.

Several assumptions were made in performing the health evaluation. It was assumed that chemicals present at the site could be transported off-site in groundwater and be consumed by persons within a 1-mile radius of the site. Further, it was assumed that off-site groundwater concentrations of indicator chemicals would equal the mean concentrations present at the site.

A comparison of the total daily indicator chemical intakes for an adult and child was made by assuming a daily water ingestion of 2 liters/day for adults and 1 liter/day for children. With the exception of bis(2-ethylhexyl) phthalate, this resulted in the estimated total daily intakes of indicator chemicals exceeding that allowed by ARARs for both children and adults.

The greatest non-carcinogenic health risks associated with potential indicator chemical exposure are due to ingestion of lead. In particular, young children (less than 6 years old) may be very sensitive to the neurotoxic effects of lead and should be considered the receptor population at greatest risk of developing lead intoxication (EPA, 1984).

The non-carcinogenic health risks associated with the calculated exposures to benzene, bis(2-ethylhexyl) phthalate, and trichloroethylene are considered minimal. There is no human evidence to suggest that exposure to these chemicals at the calculated mean concentrations in groundwater would cause chronic health effects.

Trichloroethylene, benzene and bis (2-ethylhexyl) phthalate are considered potential carcinogens. Estimates of the cancer risk associated with potential exposure to these compounds are considered low. However, the calculated risk due to exposure to benzene is higher than the risks associated with exposure to bis (2-ethylhexyl) phthalate and trichloroethylene. It is noted that the concept of "acceptable risk" due to chemical exposure is subject to much controversy, but the calculated cancer risks for exposure to trichloroethylene and benzene are somewhat above the level considered acceptable by the EPA, while the risk for bis(2-ethylhexyl) phthalate is below this level.

The public health evaluation concluded that there is the potential for exposure to the indicator chemicals at levels above acceptable concentration levels and some potential for carcinogenic risk above the 10^{-6} risk level by down-gradient users based on a conservative scenario. Due to this potential, the No Action alternative is considered not viable at the CFO/Shelby site.

6.0 Enforcement Analysis

The Celanese Site was added to the NPL in June of 1986 and EPA assumed lead responsibility for the site at that time. The Celanese Company has operated a plant on that site since 1960. Celanese initiated groundwater studies in 1981. Negotiations for the RI/FS consent agreement were concluded with the signing of the document by both EPA and Celanese on March 10, 1986.

Informal negotiations to develop a consent decree for Celanese to perform the Remedial Design/Remedial Action are under way. Formal negotiations will commence shortly after the ROD is signed.

7.0 Groundwater Remedial Alternatives

Remediation of the groundwater can be initially divided into two areas of remedial effort: those areas with high Total Organic Carbon (TOC) concentrations near the suspected sources, and those with lower TOC concentrations which are more remote from the source and near the property boundary.

Remedial technologies for controlling groundwater contamination problems generally utilize one of the following techniques:

A. Capping - involving an impermeable cover to reduce infiltration of water.

B. Groundwater pumping - involving extraction of water from and possibly injection of water into wells to capture a plume or alter the direction of groundwater movement.

C. Subsurface drains - consisting of gravity collection systems designed to intercept groundwater.

D. Subsurface barriers - consisting of a vertical wall of low permeability materials constructed underground to divert groundwater flow or minimize leachate generation and plume movement.

E. In-situ treatment to biologically or chemically remove or attenuate contaminants in the subsurface.

F. Surface treatment of contaminated groundwater after it has been removed. This includes air-stripping, activated carbon treatment, etc.

G. The "No Action: alternative involves monitoring only, no active treatment.

These technologies can be used singularly or in combination to control groundwater contamination.

A. Capping

The use of capping as a groundwater remediation technique is detrimental to moving the residual contaminants to a removal point. Due to the high water solubility of ethylene glycol and other compounds present in the contaminated soil, they lend themselves to a soil leaching technology and subsequent collection through groundwater pumping stations. Precipitation will serve as a continuing natural solvent to sustain this leaching action. In addition the potential for utilization of supplemental spray irrigation of either treated or recycled groundwater would provide for acceleration and increased efficiency of the soil leaching program. Therefore, the utilization of capping would interrupt the ability of either natural or man-made systems to enhance the leaching, and capping is not being considered further in conjunction with the groundwater remediation.

B. Groundwater Pumping

Groundwater pumping techniques involve the active manipulation and management of groundwater in order to contain or remove a plume or to adjust groundwater levels in order to limit formation of a plume. Types of wells used in management of contaminated groundwater include wellpoints, vacuum wells, and deep wells. The selection of the appropriate well type depends upon the depth of contamination and the hydrologic and geologic characteristics of the aquifer involved.

Well systems are versatile and can be used to contain, remove, divert, or limit development of plumes under a variety of site conditions. Groundwater pumping is most effective at sites where underlying aquifers have high intergranular hydraulic conductivity. However, it has been used with varying effectiveness at sites with moderate hydraulic conductivities and where pollutant movement is occurring along fractured or jointed material.

Where plume containment or removal is the objective, either extraction wells or a combination of extraction and injection wells can be used. The use of extraction wells alone is best suited to situations where contaminants are soluble with water, where the hydraulic gradient is sufficiently steep, the hydraulic conductivity is adequate, and where quick removal is not necessary.

A combination of extraction and injection wells is frequently used in containment or removal where the hydraulic gradient is relatively flat and hydraulic conductivities are moderate, or to accelerate the removal time frame. Groundwater pumping systems are the most versatile and flexible of the groundwater control technologies. Operational flexibility is high since pumping rates can be modified to adjust to changes in flow rate. System performance is generally good provided the wells are properly designed and maintained.

At the CFO/SHELBY facility, groundwater pumping provides a viable control and remediation technology for clean-up of the groundwater contamination present. Its utilization in conjunction with treatment of contaminated groundwater provides the potential for a remediation program allowing for containment of the existing contamination to its present boundaries. This technology is, therefore, retained for further consideration.

C. Subsurface Barriers

The term subsurface barriers refers to a variety of methods whereby low permeability cut-off walls or diversions are installed below ground to contain, capture, or redirect groundwater flow. The most commonly used subsurface barriers are slurry walls, particularly the soil-bentonite type slurry wall. Less common are cement-bentonite or concrete slurry walls, grouted barriers, and sheet pile cut-offs. This technology is eliminated, as other, more permanent remedies are readily available.

D. Subsurface Collection Drains

Subsurface collection drains include any type of buried conduit used to collect and convey discharge by gravity flow. Subsurface collection drains essentially function like an infinite line of extraction wells and can perform many of the same functions as wells. They can be used to contain or remove a plume, or lower the groundwater table. The decision to use drains or pumping is generally based on cost effectiveness and implementability analysis. For shallow contamination problems, drains can be more cost effective than pumping. The biggest drawback to the use of subsurface drains is that they are normally limited to shallow depths.

Again, due to the geologic conditions, topography of the site, extent of contamination and availability of more technically feasible and cost effective technologies, subsurface collection drains are not being considered further.

E. In-Situ Treatment

In-Situ treatment of the contaminated ground water does not appear to offer a potential for technologically or cost effectively treating the groundwater conditions. The physical difficulty and high costs associated with providing the nutrients and oxygen required to stimulate and sustain aerobic biological activity within the existing groundwater would be extensive. Therefore, this technology is eliminated from further discussion.

F. Surface Treatments

Air Stripping

Air stripping is the mass transfer process in which volatile contaminants in water or soil are transferred from their combined state to a gaseous state. Four commonly used methods for air stripping liquids are the packed column, cross-flow tower, coke tray aerator, and diffused air basin procedures.

Air stripping is most commonly accomplished in a packed tower equipped with an air blower. The packed tower works on the principle of counter-current flow where the water stream flows down through the packing while the air is blown upward, and is exhausted through the top. Volatile, soluble components have an affinity for the gaseous phase and tend to leave the aqueous stream for the gaseous phase. In the cross-flow tower, water flows down through the packing as in the counter-current packed column; however, the air is pulled across the water flow by a fan. The coke tray aerator is a simple, low maintenance process requiring no blower. The water being treated is allowed to trickle through several layers of trays. This produces a large surface area for gas transfer. Diffused aeration stripping and induced draft stripping use aeration basins similar to standard wastewater treatment aeration basins. Water flows through the basin from top to bottom or from one side to another with the air dispersed through diffusion at the bottom of the basin. The air to water ratio is significantly lower than in either the packed column or the cross-flow tower units.

Air stripping is normally utilized to remove volatile organics from aqueous waste streams. Generally components with Henry's Law constants greater than 0.003 can be effectively removed by air stripping. The waste feed stream must be low in suspended solids and may require pH adjustment to reduce solubility and improve transfer to the gaseous phase.

Stripping is sometimes only partially effective in groundwater treatment and must be followed by other processes such as biological treatment and carbon adsorption. The combined use of air stripping followed by other applicable processes can be an effective means of removing the contaminants from groundwater.

In recent years, air stripping has gained increasing use. It has been used cost effectively for the treatment of low concentrations of volatiles or as a pre-treatment step prior to subsequent treatment technologies. Equipment for air stripping is relatively simple, start-up and shut-down can be accomplished quickly, and the modular design of packed towers makes them somewhat mobile in their application.

An important consideration in the utilization of the air stripping technology is the implications of the air pollution which may result from the stripping operation itself. The gaseous stream generated during air stripping may require collection and subsequent treatment.

Because of the concentrations of volatile organics present in the contaminated groundwater at the site, air stripping may be applicable both as a primary and supplemental remediation technology. Therefore, this treatment technology will be retained for further consideration.

Activated Carbon Treatment

The process of adsorption onto activated carbon involves contacting a waste stream with the carbon, normally by flow through a packed bed reactor. The activated carbon process can be designed to selectively adsorb hazardous constituents by a surface attraction phenomenon in which organic molecules are attracted to the internal pores of the carbon granules.

Adsorption depends upon the strength of the molecular attraction between adsorbent and adsorbate, molecular weight, type and characteristics of the absorbent, electrokinetic charge, pH, and surface area. Once the micropore surfaces are saturated with organics, the carbon is spent and must either be replaced with virgin carbon or removed, thoroughly regenerated, and replaced. The time to reach breakthrough or exhaustion is the single most critical operating parameter. Carbon longevity balanced against influent concentration governs operating economies. In the event that the carbon is regenerated on-site, the supernatant from this process will be processed through the system constructed for treating the site groundwater.

Activated carbon adsorption is a well-developed technology which is widely used in the treatment of hazardous waste steams. It is especially well suited for the removal of mixed organics from aqueous wastes. Since carbon adsorption is an electrical interaction phenomenon, the polarity of the waste compounds will determine the effectiveness of the adsorption process. The more hydrophobic (insoluble) a molecule is, the more readily the compound is adsorbed. As a result, low solubility humic and fulvic acids which are present in the groundwater can adsorb to the activated carbon more readily than many waste contaminants and result in rapid carbon exhaustion. Also, some metals and inorganic species have shown excellent to good adsorption potential. These include antimony, arsenic, bismuth, chromium, tin, silver, mercury, cobalt, zirconium, chlorine, bromine and iodine. Activated carbon can also be utilized in the powdered form which offers the advantages of greatly increased surface area availability and reduced costs.

Carbon adsorption technology can be used either in conjunction with or following biological treatment and/or gravity filtration. Its purpose in this application is to remove the refractory organics which cannot be biologically degraded. The biological treatment and/or granular media filtration steps prior to carbon adsorption reduce the organic and suspended solids load to the carbon adsorption units. Reduction of organic and suspended solid load minimizes carbon usage and regeneration costs. Air stripping has also been applied prior to carbon adsorption in order to reduce a portion of the volatile contaminants and reduce the organic load to the carbon adsorption units.

Activated carbon usage is easily implemented into or along with other treatment systems. The process is well suited to mobile units as well as to on-site construction. Space requirements are small and start-up and shut down are rapid.

Regeneration of spent carbon for reuse is the highest operating cost associated with the utilization of carbon adsorption technology. In addition, high capital costs can be associated with its use. Both capital and operating costs can be substantially reduced through pretreatment of the waste prior to its treatment with carbon adsorption.

Activated carbon treatment will not be utilized in a primary remedial technology role at the site, but may be used as a supplementary technique in conjunction with other clean-up technologies. This technology will be retained for further consideration.

Precipitation/Flocculation

Precipitation is a physiochemical process where some or all of a substance in solution is transformed into a solid phase. The technology is based upon alteration of the chemical equilibrium relationships affecting the solubility of an inorganic species. Removal of metals as hydroxides or sulfides is the most common precipitation application in wastewater treatment.

Precipitation is applicable to the removal of most metals from wastewater, including zinc, cadmium, chromium, copper, lead, manganese, and mercury. Certain anionic species such as phosphate, sulfate and fluoride can also be removed by precipitation. The technology is useful for most aqueous hazardous waste streams. However, organometallic complexes with metals can inhibit precipitation. Cyanide and other constituents may also complex with metals, thereby, reducing the treatment efficiency of precipitation.

Precipitation and flocculation are well-established technologies. A disadvantage is that precipitation is non-selective and that compounds other than those targeted may be removed. Both precipitation and flocculation are non-destructive and generate a large volume of sludge which must be disposed of ultimately.

This technology will be retained for further consideration.

Biological Treatment

Biological treatment is utilized to remove organic matter from a waste stream through microbial degradation. The most common type of biological treatment is aerobic (in the presence of oxygen). A number of biological treatment processes exist which are used for the treatment of aqueous hazardous wastes. They include conventional activated sludge, modifications of the activated sludge process, pure oxygen activated sludge, extended aeration, and contact stabilization. Fixed-film systems include rotating biological discs and trickling filters.

In the conventional activated sludge process, waste flows into an aeration basin where it is aerated for several hours. During this time, a suspended active microbial population aerobically degrades the organic matter in the waste stream along with producing new cells. A simplified equation for this process is:

$$\text{Organics} + O_2 \longrightarrow CO^2 + H_2O + \text{new cells}$$

The cells produced during aeration along with other precipitated materials form a sludge which is settled out in a clarifier. The clarified water then goes to disposal or further treatment.

Fixed-film systems involve contact of the aqueous waste stream with microorganisms attached to some inert medium such as rock or specially designed plastic material.

Biological treatment has considerable flexibility due to the variety of processes available and the adaptability of the microorganisms themselves. Most organic chemicals are considered biodegradable, although the ease of biodegradation varies widely. Several general observations can be made with regard to the ease of treatability of organics by aerobic biological treatment:

- Unsubstituted non-aromatics or cyclic hydrocarbons are preferred over unsubstituted aromatics.
- Materials with unsaturated bonds such as alkenes are preferred over materials with saturated bonds.
- Soluble organics are usually more readily degraded than insoluble materials. Biological treatment is more efficient in removing dissolved or colloidal materials, which are readily attacked by enzymes. This is not true for fixed-film treatment systems which preferentially treat suspended matter.
- The presence of optional groups effects biodegradability. Alcohols, aldehydes, acids, esters, amides, and amino acids are more biodegradable than corresponding alkanes, olefins, ketones, dicarboxylic acids, nitrites, and chloroalkanes.
- Halogen-substituted compounds are the most refractory to biodegradation.

Industrial type wastes may not be readily amenable to biological treatment; however, microorganisms can be acclimated to degrade many compounds that are initially relatively non-biodegradeable.

Additionally, heavy metals may be inhibitory to biological treatment, but the biomass can be acclimated, within limits, to tolerate elevated concentrations of metals.

The completely mixed activated sludge process is the most widely used with high organic loads, and high purity oxygen systems have advantages for hazardous waste site remediation. However, a number of other parameters influence the performance of the biological treatment system. These parameters are the concentration of suspended solids, oil and grease, organic load variations, and temperatures.

Biological treatment has not been as widely used in hazardous waste site remediation as activated carbon adsorption, filtration and precipitation/flocculation. However, the process is well established for a wide variety of organic contaminants.

Although biological treatment can effectively treat a wide range of organics, it has several disadvantages in conjunction with hazardous waste site applications. The reliability of the process can be impaired by "shock" loads of toxics. In addition start-up times can be slow if the organisms need to be acclimated to the wastes and the detention time can be long for complex wastes. The existence of an acclimated culture can dramatically decrease start-up and detention time.

Rotating biological contactors have the advantages for use at hazardous waste treatment sites in that they are compact, can handle large flow variations and high organic shock loads. In addition they- do not require the use of mechanical aeration equipment.

The sludge produced in biological waste treatment process may be a hazardous waste itself due to the sorption and concentration of toxic and hazardous compounds contained in the wastewater. If the sludges are hazardous, it must be disposed of in a RCRA-approved manner. If the sludge is non-hazardous, disposal should conform with state sludge disposal guidelines. Biological treatment has been screened and determined to be a viable treatment alternative for the site contamination present. A more detailed discussion of its use is included in the remedial action portion of this report.

Ion Exchange

Ion exchange is a process where the toxic ions present in a waste stream are removed by being exchanged with relatively harmless ions held by the ion exchange material. Ion exchange resins are primarily synthetic organic materials containing ionic functional groups to which exchangeable ions are attached. These synthetic resins are structurally stable (can tolerate a range of temperature and pH), exhibit a high exchange capacity, and can be utilized to selectively exchange ions.

Ion exchange can be used to remove a wide range of inorganic species from water such as:

- o all metallic elements when present as soluble species, either anionic or cationic
- o inorganic anions such as halides, sulfates, nitrates, cyanides, etc.
- o organic acids such as carboxylics, sulfonics, and some phenols
- o organic amines

Sorptive resins can also remove a broad range of polar and non-polar organics. A practical upper limit for ion exchange is about 2,500 to 4,000 mg/l (ppm). Suspended solids in the feed stream should be low, less than 50 mg/l (ppm) to prevent plugging the resin, and the waste stream must be free of oxidants.

Ion exchange is a well established technology for heavy metal removal and hazardous anion removal from dilute waste solutions. A problem which exists with the ion exchange technology is the disposal of contaminated regeneration solutions. Consideration should be given to selection of these solutions when evaluating the technology.

Based on the data available for this screening, the contaminants present, amenability of other treatment technologies, and costs, ion exchange is not being considered for further evaluation as a remedial technology at CFO/SHELBY.

Filtration

Filtration is a physical process where suspended solids are removed from solution by forcing a fluid through a porous medium. Granular media filtration is normally used for treating aqueous waste streams. The filter media (generally sand) is contained within a basin and is supported by an underdrain system which allows the filtered liquid to be drawn off while retaining the filter media in place. As the wastewater laden with suspended solids passes through the filter media, the solids become trapped on top of and within the bed. To prevent plugging, the filter is backwashed at high velocity to dislodge the solids. The backwater produced contains high concentrations of solids and requires further treatment.

The granular media filtration process is only marginally effective in treating colloidal size particles. Filtration equipment is relatively simple, readily available, easy to operate and control, and to integrate with other treatment technologies. There is also extensive experience with the operation of granular media filters at hazardous waste sites.

Although granular media filters are a cost effective and efficient treatment technique in a wide variety of applications, filtration as a primary remedial technology does not appear to be needed. Therefore, this technology is eliminated from further consideration.

G. NO ACTION ALTERNATIVE

A number of consideration must be made in evaluating the effects of choosing a No Action Alternative. Under the No Action Alternative, groundwater would remain contaminated with substances that may be regulated by local, state, and federal laws. The No Action Alternative would not provide remedial action to reduce mobility, toxicity or volume of contaminated soil. Possible socioeconomic impacts of the No Action Alternative include the following:

* Decline in property values
* Expenditure for legal services
* Depressed area growth
* Restricted access to site
* Public and environmental exposures

The Remedial Investigation concluded that groundwater contamination had not migrated past the site boundaries at that time. However, the investigation did not identify a constraint to off-site migration if the measured groundwater contamination was not abated.

The Public Health Assessment was presented in Appendix A of the Feasibility Study and evaluated the effects of exposure to selected indicator compounds at the average concentration measured in the site monitor wells. Due to the fact that four out of five indicator compounds were above acceptable contaminant levels, and due to the proximity of off-site private wells used for residential drinking water supplies, the health assessment concluded that the No Action Alternative was not viable at the site.

8.0 Recommended Alternative

The recommended alternative for remediation of groundwater contamination at the Celanese Fibers Operations Site includes extraction of contaminated water and treatment in an on-site treatment system. This alternative will cost approximately $2 million, including operation and maintenance costs for an estimated 30 year period (Table 8-1).

The groundwater remediation program will consist of removing the groundwater through two tiers of extraction wells, and subsequently treating the water with a combination of treatment techniques in a specified sequence. The first tier of wells will be constructed near the eastern perimeter of the property as shown on Figure 8-1. A second tier of extraction wells will be installed in the area of highest contaminant concentration within the interior of the plume, also shown on Figure 8-1. The first tier of extraction wells will be located in a zone of lower contaminant concentration than the second tier of wells, and therefore, the treatment of the pumped groundwater will not need to be as extensive or complex as that associated with the interior plume groundwater remediation effort.

The areal and vertical extent of the plume to be removed was developed from the total organic carbon (TOC) concentrations. A review of the data indicated that the bulk of the contamination in the groundwater appeared to be in the intermediate depths (30 to 50 feet) to rock (50 to 80 feet). Furthermore, the total organic carbon plume in general incorporates most of the areas showing elevated metals concentrations. Thus, the groundwater extraction system proposed for removing the total organics present should also be capable of removing the metals involved.

The groundwater treatment alternatives being proposed can initially be divided into two areas of remedial effort. Those areas with high TOC concentrations near suspected contaminant sources, and those with lower TOC concentrations more removed from the sources.

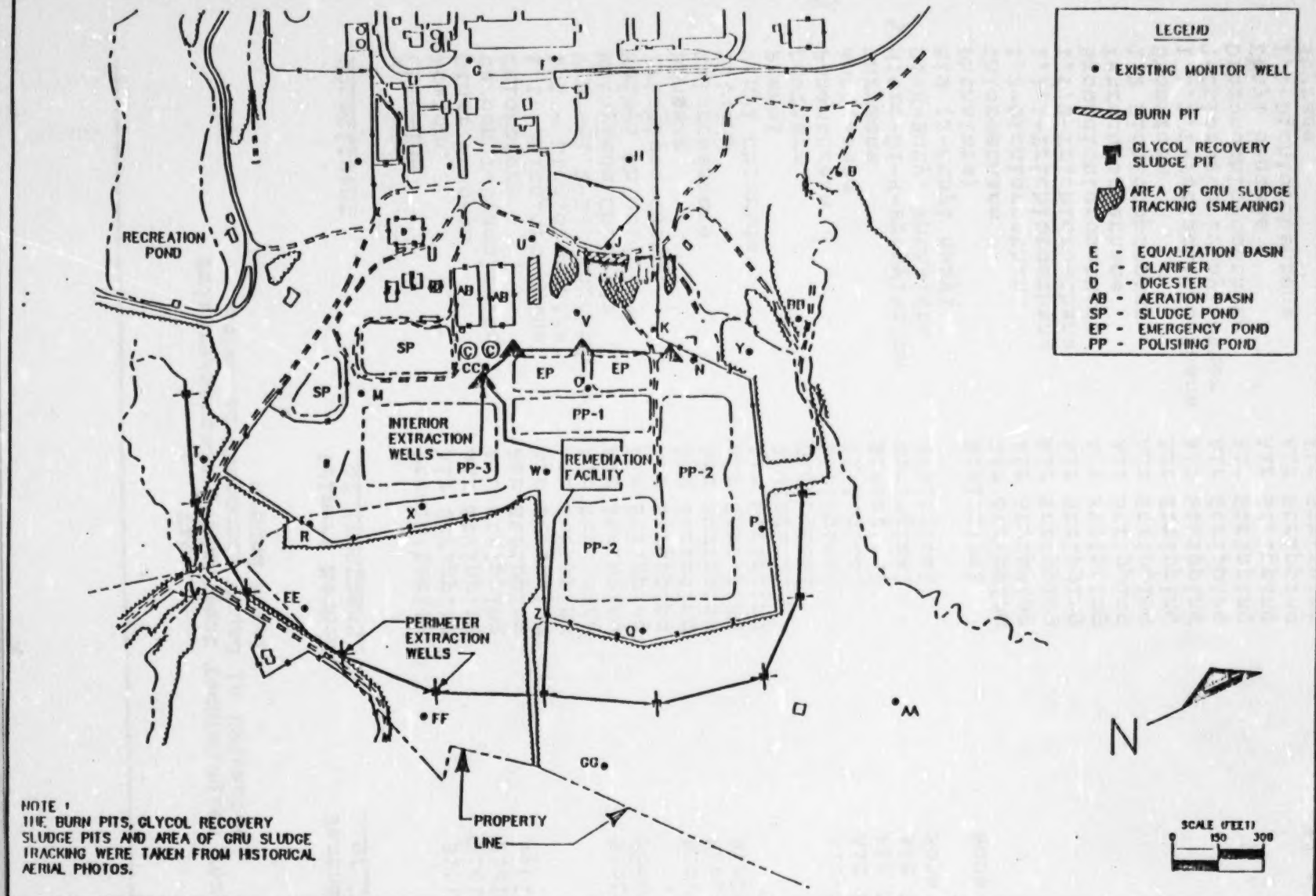
Table 8-2 lists some of the constituents identified in the groundwater at the site, and applicable primary and secondary treatment technologies. The primary treatment technologies proposed for treating the extracted groundwater are air stripping and biological treatment.

Table 8-1
Cost Estimate
Ground-Water Extraction System

Objectives: To intercept and treat the existing contaminated ground water emanating from the primary source area.

Ground Water Extraction System
Installation

A. Well Installation (maximum of 16 wells)	$177,820
B. Trenching/Electrical	$160,000
C. All Weather Road	$125,000
D. Ground-Water Treatment System	$250,000
Subtotal	$712,820
D. Engineering Fees (10% capital costs)	$72,000
E. Permitting (5% Capital Costs)	$36,000
F. Contingency (20% capital costs)	$142,000
Subtotal	$962,820
G. Operation and Maintenance (30 year period)	$1,069,230
Total	$2,032,050



NOTE :
THE BURN PITS, GLYCOL RECOVERY SLUDGE PITS AND AREA OF GRU SLUDGE TRACKING WERE TAKEN FROM HISTORICAL AERIAL PHOTOS.

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Table 8-2
Primary/Secondary Treatment Technologies For
Selected Compounds Found in Extracted
Ground Waters

Constituent	Primary Method of Treatment	Secondary Method of Treatment
Chromium	Precipitation *	
Acetone	Air Stripping	Biological
Other Ketones	Air Stripping	Biological
Carbon Tetrachloride	Air Stripping	Biological
Chloroform	Air Stripping	Biological
1,1 - Dichloroethene	Air Stripping	
1,1 - Dichloroethane	Air Stripping	
Trans-1,2-Dichloroethene	Air Stripping	
Methylene Chloride	Air Stripping	Biological
Methyl Chloride	Air Stripping	None Known
Trichloroethene	Air Stripping	
Benzene	Air Stripping	Biological
Chlorobenzene	Air Stripping	Biological
Toluene	Air Stripping	Biological
Vinyl Chloride	Air Stripping	
Phenol	Biological	
DowTherm	Biological	
Penanthrene	Biological	Air Stripping
Anthracene	Biological	Air Stripping
Chrysene	Biological	Air Stripping
Nitro-Di-N-Propylamine	Biological	Air Stripping
Di-N-Butyl Phthalate	Biological	None Known
Bis (2-Ethyl hexyl Phthalate)	Biological	None Known
Chloroethane	Air Stripping	
1,2-Dichloroethane	Air Stripping	
1,1,1-Trichloroethane	Air Stripping	
1,1,2-Trichloroethane	Air Stripping	
Bromodichloromethane	Air Stripping	
Tetrachloroethene	Air Stripping	
1,2 Dichloropropane	Air Stripping	
Bromoform	Air Stripping	
1,1,2,2-Tetrachloroethane	Air Stripping	
2-Chloroethylvinyl ether	Air Stripping	
Dibromochloromethane	Air Stripping	
Ethyl benzene	Air Stripping	
1,2-Dichlorobenzene	Air Stripping	
Styrene	Air Stripping	Biological

* with pH adjustment

Table 8-2 indicates that the constituents present in the groundwater are amenable to either one or more of the proposed treatment technologies being considered.

The groundwater treatment alternative recommended for the areas with high total organic carbon concentrations (interior wells) will consist of air stripping and biological treatment, followed by carbon adsorption, if needed. The extracted groundwater will be pumped from the interior tier of wells to a common equalization/sedimentation tank where suspended solids will be removed. Utilization of the equalization/sedimentation tank will minimize the suspended solid material present, and will provide a blended stable flow stream from the four extraction wells for the subsequent groundwater treatment

The equalized flow will then be pumped to the air stripping tower where the volatile organic fraction will be removed or reduced.

Volatiles present in the groundwater such as vinyl chloride; methylene chloride; 1-1-dichloroethene, 1,1-dichloroethane; trichloroethene; etc. should be reduced 90 to 98 percent by air stripping. Semi-volatile removal should range between 30 to 80 percent at ambient air temperatures.

The stripping tower effluent will then be pumped to a biological treatment system. No specific biological treatment process has been selected. As the data from the pumping test are evaluated in the terms of expected variations in concentrations, flow variations, constituents, etc., a decision will be made regarding the preferred method of biological treatment.

The effluent from the biological treatment will be discharged to a carbon adsorption unit designed for this anticipated flow. This unit will be used as a final treatment step to remove refractory organics that may remain after biological treatment.

Effluent from the treatment system will be discharged to the existing wastewater treatment plant for discharge under the existing North Carolina NPDES discharge permit. In cases where metals, such as chromium, are present in the treatment system effluent above allowable discharge levels, the effluent will be passed through a chemical precipitation step prior to final discharge.

The groundwater treatment alternative proposed for the areas of lower total organic carbon concentration (perimeter wells) will consist of air stripping followed by carbon adsorption. Because of the low concentration of constituents expected in this area and their general amenability to the use of air stripping for removal, the utilization of biological treatment is not anticipated. Thus, the effluent from the air stripping unit will be discharge to a carbon adsorption unit for final treatment prior to discharge. The carbon unit will be designed to handle the anticipated maximum flow from the perimeter well system. Again, should problems with metals be encountered, a precipitation step will be added to the treatment sequence being employed. Treated water from the groundwater treatment system will be discharged in the same manner as discussed previously for the groundwater from the interior of the plume.

This recommended alternative meets the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR, 300.68(j) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). This alternative permanently and significantly reduces the mobility of hazardous contaminants in the area groundwater. The recommended alternative for the source material will be determined at the end of the additional studies.

Technical Evaluation

Performance of a remedial action is determined basically by its effectiveness and its life expectance in performing its specified function. Effectiveness refers to the degree to which an action will meet the remediation goal, which is a reduction of toxicity, mobility, or volume of contamination or the removal of exposure routes. The effective life is the length of time this level of effectiveness can be maintained.

Both the groundwater extraction system and groundwater treatment system proposed can be considered to be effective in their remedial efforts. They address the questions of reduction of toxicity, mobility, and volume of contamination in a very positive manner. In addition, they also have a positive effect on the removal of a potential exposure route, the ground water.

Reliability is the degree of assurance that the particular remedial action being considered will meet or exceed the expectations for its performance, the likelihood that mechanical and process failure will occur, and the consequences of such failures. This is directly related to the complexity of the equipment and process selected for the remediation effort. Important considerations concerning reliability are operation and maintenance requirements, and the demonstrated performance of similar applications.

In the case of the groundwater remediation, the simplicity of the groundwater extraction system provides it with a high reliability factor. Also, the treatment technologies selected for subsequent treatment of the ground water are all well known, tested, and accepted technologies which provides reliability to the proposed treatment plan.

Health and safety takes into account the potential threat to health and safety of site personnel both during the implementation of the remedial action alternative and during its operation.

Remedial technologies were evaluated with respect to a number of safety risks including the need for personnel to handle contaminated or hazardous materials and the possibility of the production of toxic gases or airborne contaminants.

Operating conditions for the processes were also considered along with their effect on safety.

Construction of the interior tier of wells presents the greatest potential for encountering contaminated materials. The work area will be monitored with air monitoring equipment to identify the need for respiratory equipment, and dermal protection will be provided during the field operations. Construction of the perimeter line of wells is expected to produce a lesser potential for exposure because of the lower concentration of groundwater contaminants in that area. However, health and safety considerations similar to those for the interior tier of wells will be maintained.

Trenching activities for pipe and electrical supply line construction, where used, and general grading for the treatment facility construction are not generally expected to encounter contaminated materials. However, operations in the area adjacent to the former disposal areas may encounter contaminated soils. These operations will be monitored similar to the interior well construction activities to identify proper safety procedures.

All personnel involved in construction and operation of the extraction and treatment system will be trained in accordance with the governing OSHA provisions contained in 29 CFR 1910.120.

The extraction and treatment alternative was evaluated with regards to its implementability. These considerations include such things as difficult engineering requirements, availability of equipment, and permit, treatability, or pilot study requirements. Also included is the time required to attain the desired results for the particular remedial alternative being proposed. The groundwater extraction and treatment alternative uses available technologies that do not require unusual engineering specialities for design and does not require specialty equipment to implement. However, pump testing of the aquifer is planned to provide input for the extraction well design and bench scale treatability studies are anticipated to verify the treatment technologies to be used. The implementation of this alternative will continue for several years with the completion of the activity identified by monitoring that verifies that the contaminant levels have been reduced to the ARARs specified by the regulatory agencies. The duration of the cleanup can be shortened by the successful removal and treatment/destruction of the source, and by accelerated leaching by irrigation.

This combination of treatments is the most efficient and cost-effective remedy. It is also the most technically feasible of the groundwater remedial alternatives discussed in Section 7.0 of this document.

Consistency with Other Environmental Laws

* Occupational Safety and Health Administration (OSHA)

  A health and safety plan will be developed during remedial design and will be followed during field activities to assure that regulations of OSHA are followed.

* Endangered Species Act

  The recommended remedial alternative is protective of species listed as endangered or threatened under the Endangered Species Act. Requirements of the Interagency Section 7 Consultation Process, 50 CFR, Part 402, will be met. The Department of the Interior, Fish and Wildlife Service, will be consulted during the remedial design and additional source characterization studies to assure that endangered or threatened species are not adversely impacted by implementation of this remedy.

* Ambient Air Quality Standards

The groundwater treatment system will be designed and monitored to assure that air emissions meet all state and Federal standards.

* National Pollutant Discharge Elimination System (NPDES)

Discharge from the treatment system will flow into the existing wastewater treatment system. This practice will continue only so long as the discharge from the wastewater treatment system stays within the existing NPDES permit.

* Safe Drinking Water Act (SWDA)

Maximum Contaminant Levels (MCLs) established under the SDWA were found to be relevant and appropriate to remedial action at the Celanese Fibers Operations Site and will be considered the cleanup criteria except in instances where the North Carolina State MCLs are more stringent.

* Resource Conservation and Recovery Act (RCRA)

The recommended remedy for groundwater contamination is not regulated under RCRA, therefore it does not apply.

* Floodplain Management Executive Order 11988

The CERCLA areas do not lie within a floodplain, and, thus are not subject to the requirements of E.D. 11988.

* Department of Transportation (DOT)

Transport of hazardous substances is regulated by the DOT. We do not anticipate this alternative requiring transportation of materials off-site.

* State Drinking Water Standards

Maximum Contaminant Levels established by the State of North Carolina as given in 15 NCAC 2L were found to be relevant and appropriate in all instances where the state MCL is more stringent than the SDWA MCL.

Specifically, for the purposes of this remedy, all compounds detected in the groundwater which are not naturally occurring must be removed from groundwater until the concentration of that compound has fallen below the lowest analytical method detection limit published by EPA for that particular compound.

9.0 Community Relations

A public meeting was held on September 24, 1985 to present the draft RI/FS work plan to interested parties.

Two information repositories have been established for the site, one in Earl, North Carolina and one in Shelby.

A public meeting was held on July 21, 1986 to present the findings of the Remedial Investigation to interested citizens.

On February 3, 1988, a public meeting was held to discuss the results of the Feasibility Study with interested citizens. At that time, EPA also presented the preferred remedial alternative.

Numerous questions were asked at the meeting and a number of comments have been received. Few comments were on the selected alternative. The majority of the comments received were actually requests to have private wells sampled. These requests are being handled by the Cleveland County Health Department in concert with the North Carolina Department of Human Services.

The public did show a desire for remediation of the site. No opposition from the public is expected if the recommended remedial alternative is implemented.

A Responsiveness Summary has been prepared to summarize community concerns and EPA's community relations activities.

ATTACHMENT

1.0 RESPONSIVENESS SUMMARY

Celanese Fibers Operations Site, Shelby, North Carolina

Responsiveness Summary

This community relations responsiveness summary is divided into the following sections:

Section I. Overview. This section discusses EPA's preferred alternative for remedial action and likely public reaction to this alternative.

Section II. Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns raised during remedial activities at the Celanese Fibers Operations site.

Section III. Summary of major comments received during the Public Comment Period and the EPA responses to the comments. Both the comment and EPA's response are provided.

Section IV. Remaining Concerns. This section describes remaining community concerns that EPA should be aware of in conducting the remedial design and remedial action at the Celanese Site.

1. Overview

At the time of the public meeting and the beginning of the public comment period, EPA presented its preferred alternative to the public. This alternative specified in the Record of Decision (ROD) includes: extraction of contaminated groundwater and treatment of the contaminated water.

The community favors remedial action though few citizens expressed a preference for a particular process.

2. History of Community Concerns

Citizens of the Earl/Shelby area have expressed great interest in activities relating to the Celanese Fibers Operations site. The citizens of Earl, North Carolina, with the assistance of Diana Travis and other staff members of the Clean Water Fund of North Carolina, organized the United Neighbors For Cleanup at Earl because of their concern about the quality of water for their families. Les Brown, Conservation Chair of the Broad River Sierra Group of Boiling Springs, has also expressed an interest in the site. Many newspaper articles have been written by Donna Clemmer of the The Shelby Star concerning contamination at the site.

3. Summary of Public Comments Received During Public Comment Period and Agency Responses

Comments raised during the February 3, 1988 Celanese Public Meeting are summarized briefly below:

Questions and comments by participants fell into five general areas: the adequacy of the proposed conceptual remedy to protect human health and the environment, the current potential impact upon area residents and their property, the potential for cleanup activities to adversely impact nearby residents, the desire to be informed of test results on individual wells, and finally, the availability of an EPA Technical Assistance Grant (TAG) to the community. The comments and questions from the public and from representatives of Celanese Fibers Operations who attended the meeting are summarized below, followed by EPA's response to each major point or question.

A. Adequacy of Proposed Remedy to Protect Human Health and the Environment

Citizens raised numerous questions and concerns about how the proposed remedy would ensure that air and water quality were protected. Specific issues raised included:

How will metals like lead, chromium and other potential carcinogens be removed from contaminated ground water?

EPA: Air Stripping will be the first step followed by biological treatment and, if needed, activated carbon treatment and precipitation. The water would then receive additional treatment in the CFO wastewater treatment facility. Any water discharged from the facility must continue to meet current permit standards.

Will an ion exchange alternative be considered in treatment?

EPA: This is part of the chemical action involved in carbon absorption.

Will the air-stripping unit simply remove contaminants from the groundwater and discharge them to the air?

EPA: Yes. The air stripper will remove contaminants to achieve quality safe for drinking. The air stripping tower removes volatile and some extractable organic compounds by blowing air through water. This will result in some discharge to air, however they will quickly disperse so as to be undetectable in the atmosphere.

What standards will be applied to ensure air quality, since North Carolina has no air toxic regulations? Participants asked if EPA would adhere to North Carolina's proposed regulations. In stressing the need for a standard, one citizen suggested EPA follow the National Academy of Sciences (NAS) recommended air quality standards.

EPA: EPA will look at North Carolina's proposed regulations and the NAS suggested standards but will rely on Federal air quality regulations to ensure protection of human health.

What action will be taken to monitor and ensure that air quality standards are enforced; would stack tests, for example, be done on the air stripper?

EPA: The actual system to monitor and protect air quality will be developed in the design stage of this process. EPA will present the design to citizens and seek public comment.

Will additional off-site properties be tested to ensure that contamination does not migrate to them?

EPA: Yes. At the design stage; in July, EPA will have a clearer picture of which wells would be best to sample. Citizens will have an opportunity at that time to comment on the design.

Are the proposed groundwater pump tests experimental or a procedure that has been tried in similar circumstances?

EPA: Pump tests are performed as a matter of routine at other sites in order to design extraction systems that will gather all the contaminated ground water without adversely affecting private wells in the area.

Since the more contaminated interior ground water flows toward and eventually would mix with exterior levels, will EPA's two-tiered well extraction system misrepresent groundwater treatment results?

EPA: That might have been the case if the results were used to measure contaminant reductions in one location or the other, however the water will be judged as a whole. Both areas will be subjected to treatment and must be cleaned up to acceptable standards.

One citizen recommended that a carbor adsorption unit(s) should be part of the ground-water treatment design to ensure its capability to remove contaminants that may not have settled out or been removed by the air stripping unit(s).

EPA: The carbon treatment unit(s) will be part of the treatment design. Water at that stage of the process may already have been cleaned up and the carbon treatment would be redundant at that point. Nevertheless a carbon treatment unit(s) will be installed.

How often will the effluent from the wastewater treatment plant be tested? Can the facility's current system handle the water that will come from groundwater treatment and still protect the streams where discharge will occur?

EPA: This has not been determined as yet; EPA would welcome suggestions as to the frequency of testing or an appropriate monitoring schedule. It could be continuous for a period of time.

How will residue from the thermal treatment of soils and sludges be handled and how will air quality be assured?

EPA: Because more information is needed on the best methods for physically extracting the soils and sludges, as well as treating them, EPA has not yet decided the specifics of how residues from thermal processes will be handled . This will be determined after further materials testing and during the design stage for this phase of the cleanup.

B. Current Potential Impact on Health and Property of Area Residents

Residents raised the following questions or observations about how the site may already have impacted or will impact their health or property:

Is our water safe for drinking, for other uses?

EPA: EPA is confident that the RI/FS studies are thorough and that the source of the contamination has been found. One off-site well that has demonstrated contaminant levels of concern, possibly stemming from contamination from the site, will be treated at the company's expense. For peace of mind any resident who wishes could use bottled water for drinking, but EPA is not recommending this as necessary.

Several residents stated that they had not received results from prior tests of their well water and requested that testing be done.

EPA: Most of the tests referred to were conducted by the Cleveland County Health Department. Citizens were encouraged to write to the County and ask for the results. EPA would also request copies of these test results and will assist residents who inquire, in interpreting the test results. The point was also stressed to residents requesting tests to be done, that requests should be directed to the Cleveland County Health Department in writing. record of the request may later help EPA assist residents in receiving or interpreting information.

One resident questioned the current standards applied to the discharges of Celanese wastewater into the creek. The person noted that there was no life in the creek, and that animals had died.

EPA: The discharges are regulated under a permit issued by the State of North Carolina. Concerned residents can request a copy of the permit from the State Department of Human Resources or Mr. Hanke at EPA would send a copy of the permit upon written request. In addition, citizens can provide input to the standards to be met under the permit at the time of its renewal. It was believed that the renewal date was 1990.

Residents asked about Celanese's current waste handling methods and the possibility of future problems of the same nature.

William Mayrose, CFO/Shelby Plant Manager: Wastes currently generated are not stored on-site. They are transported to a licensed waste facility.

C. Potential Adverse Impacts on Adjacent Properties from the Cleanup Activities

In addition to concerns about air quality mentioned earlier in this document, residents expressed concern about the impact of waste cleanup activities on their water supplies or nearby streams and ponds. These concerns were addressed as follows:

Will pumping to remove ground-water decontamination cause a drop in the water table and potentially cause wells to go dry?

EPA: This is a matter EPA has weighed carefully and in order to determine the means to protect area wells, a pump test will be conducted. This will involve digging a test well, pumping at various rates, and monitoring area wells to see the effects of the pumping. The extraction system will be designed based on information gained from this test.

Will excavation cause erosion and the run-off of contaminated water down the hillsides and onto adjacent properties?

EPA: No. Stormwater diversion and collection systems will be part of the cleanup design so that no releases of materials being cleaned up will occur.

D. Availability of Technical Assistance Grants (TAGs)

Several meeting participants expressed interest in receiving technical assistance grants and the following questions were raised:

What is the timing for start-up of the TAG program; will that be sufficient time for the community to be involved in shaping the decision on the CFO cleanup? Is there anything the community can do to speed up the process? Can EPA re-open its decision process once, or if, community succeeds in getting a grant?

EPA: A National workshop in Dallas the second week of February is expected to resolve some lingering questions about implementing the TAG program, for example questions regarding financial arrangements. The process of applying for TAGs is expected to be in place in about six weeks. EPA Region IV will distribute fact sheets on how to apply. The design phase for the CFO site will not have been decided by that time. EPA anticipates having a proposed remedial design by July 1988. EPA's policy and that of Congress is not to hold up Superfund cleanups for technical assistance grants. EPA Region IV will do everything possible to see that this community receives priority attention when applying for the TAG.

Would it be feasible for Celanese to award a TAG to the community?

EPA: Celanese would have to respond to that. William Mayrose, CFO Plant Manager: Celanese has a technical resource on the project and is hiring Clean Sites, Inc. as a second independent resource. The company sees no reason to bring in a third technical resource.

For further detail and clarification on all comments raised during the meeting, interested persons can refer to the public meeting transcript.

The comment period on the Feasibility started on February 3, 1988 (the day of the public meeting) and closed on February 24, 1988. One set of comments was received on February 25, 1988. These will be addressed here with the other written comments received:

1. Thirteen residents wrote to request their wells be sampled.

EPA Response: A sampling effort is underway under the initiative of the Cleveland County Health Department. The Health Department, in conjunction with the State of North Carolina, have begun sampling wells as requested by these citizens.

2. Two citizens wrote to express concern over possible changes in air quality near the site due to the air stripping process.

EPA Response: The groundwater treatment system will conform to applicable or appropriate and relevant air quality standards.

3. Three citizens wrote to express concern about possible waste burial sites near the site.

EPA Response: A number of off-site burial areas have been investigated by the State of North Carolina. These reports are available from the State. Any information on burial sites not previously investigated should be forwarded to the state superfund office.

4. Three people wrote to request additional information on Technical Assistance Grants.

EPA Response: These requests were handled directly by the US EPA Region IV Public Affairs Branch with a letter giving current information on the status of the TAG.

5. Two people wrote to request information concerning the site in general.

EPA Response: These people were referred to the two site repositories.

6. One resident wrote to ask "with the sludge removal, and the well water treatment, is it the opinion the in some number of years, water treatment will no longer be required?"

EPA Response: Yes. The Agency's plan is to implement a permanent remedy at the subject site. Therefore, at some time in the future, we anticipate moving from active treatment to monitoring of groundwater.

7. A representative from the Sierra Club wrote to ask the following questions: "How about taking the water from the carbon adsorption unit - back to the ground via irrigation, etc. This will loop the waste for re-cleaning and will restore groundwater levels."

EPA responses: The preferred alternative will result in the water being cleaned" to the applicable or appropriate and relevant standards, therefore, no "re-cleaning" will be necessary. Additionally, recharge in the area is fairly slow, therefore a discharge to the surface would probably not impact water table levels significantly.

8. One family had the following three questions/comments:

   A. "Our main concern is long-range testing of off-site wells to ensure safety of drinking water for citizens."

EPA Response: This question will be answered as part of the Remedial Design.

B. "How will the water table be effected by pumping groundwater in the cleanup process (air stripping)?"

EPA Response: The effect of the pumping on the water table level in the surrounding wells will be determined as part of the pump test at the site. The system will be designed so as to minimize this possibility.

C. The third question concerned Technical Assistance Grant availability.

EPA Response: This question was answered with a letter to the questioner explaining the current status of these grants.

9. A letter was received on February 25, 1988 from the United Neighbors for Cleanup. They had the following questions/comments:

A. <u>All neighboring drinking water wells should be tested now for a full range of organic and inorganic chemicals, and the results should be explained in an informal meeting between the users of those wells and representatives of EPA and/or other agencies. These representatives should have the expertise to answer questions about potential health effects of individual chemicals and synergistic effects of combined chemicals.</u>

EPA Response: It is our understanding that a program has been set up in conjunction with the Cleveland County Health Department to have private wells sampled as requested. We would be happy to assist in the evaluation of any analytical results from this program and to speak or meet with any well owners about those results. As before, we are also available for such assistance in formal or informal public meetings to discuss these results as they become available. Also, the results of any such analyses may shed some light on the groundwater hydrology of the area, and we would be eager to review any results on that basis as well.

B. A regular well testing schedule should be instituted, with wells in each neighborhood tested over a period of years to monitor any movement of contamination off-site. Even if the proposed groundwater pumping and treatment operates to prevent further movement off-site, there has not been enough testing to assure that the contamination has not already passed the site boundaries.

EPA Response: It has been determined that a random selection of off-site wells will be included as part of the operation and maintenance (O&M) sampling plan. The O&M Plan is considered part of the Remedial Design and will be available for public comment in mid-July.

C. During the February 3 meeting, we were told that Celanese plans to clean up Mr. James Elliott's well. However, at that time, Mr. Elliott had never been informed of that promise. We request written confirmation of the promise, including information about the procedure for cleanup and a timetable for implementation.

EPA response: The agreement with Celanese to remediate the Elliott well was confirmed in writing the day of the public meeting. Written confirmation of the agreement will be forwarded to both information repositories

D. The Record of Decision should include a provision for the supplying of drinking water at the expense of Celanese to any neighbors whose wells are contaminated by chemicals from the site. The burden of proof should be on the owners of the site to prove that any contaminants did NOT come from the Superfund site, not on the neighbors to prove they did.

EPA Response: It will be difficult for CFO or their consultants to positively "prove" that any contamination found at some future date in a nearby private well did not originate from the site. This is the situation that currently exists with the Elliott well; it will be extremely difficult and costly for CFO to demonstrate, with reasonable certainty, that contamination found in this well is not site specific. In these situations, the best that can be done is to evaluate the existing data, and try to come to a reasonable conclusion based on that data as to whether or not any observed contamination is

site specific. The selected remedial action will be designed to prevent further contaminant transport from the site, and since groundwater movement and contaminant transport is relatively slow, the time between now and the implementation of the remedial action should not be sufficient to allow widespread further contamination. Therefore, the concern regarding future contamination, while understandable, is based on events that are unlikely to occur.

E. Any level of groundwater contamination attributable to the site should be cleaned up, even if it does not exceed current drinking water standards. Scientific knowledge of the effects of long-term exposure to low levels of contaminants is incomplete, and the company should be responsible for removing any contamination it caused.

EPA Response: Groundwater clean-up goals may be set in a number of ways, some of which are consistent with the concept of remediation to background levels. Often, however, clean-up goals for extraction wells located on-site are set at drinking water standards or some other health-based criteria. In such a case, contaminant transport from the waste site to any off-site

water supply wells will further reduce concentrations and provide an additional margin of safety. Finally, EPA regulations allow for setting of alternate concentration limits under appropriate circumstances, and it is therefore not possible for EPA to rule out such a possibility. The determination of groundwater clean-up goals will be based on site-specific application of applicable or relevant and appropriate regulations in a manner that is protective of public health and the environment. Therefore, the 15 NCAC 2L standards of the State of North Carolina are considered the appropriate clean-up criteria for this site.

F. Surface water exits the site in several streams. Each stream and its sediment should be tested, over time, to ensure that contamination is not leaving by that route. In addition, the recreation pond on-site should be tested (or, if tests have been conducted, we request that they by made available), and the discharge from the pond that passes through adjacent property should be monitored over time.

EPA Response: Testing of these media was conducted during the Remedial Investigation (RI) at the site. This information is currently available to the public in the RI report located in the two site information repositories.

G. The Record of Decision should include a provision for modeling of any pump and treat system for groundwater to determine the effect it may have on supplies in neighboring wells. If the treatment lowers the water table or causes any adverse effects, the company should pay for providing an alternate supply of water to affected neighbors to avoid creating a new problem while solving an existing one.

EPA Response: The concern expressed regarding the effects of any groundwater extraction system installed at the site on nearby private wells is a valid one. The remedial design will take into account aquifer characteristics and hydrologic response to stress as determined by the proposed pump test to be conducted at the site. Agency review will also help insure that the pump and treat system will not adversely affect water quality or yield in private wells in the vicinity.

H. Community air should not be used to clean a Superfund site. Any air stripping of groundwater should be done in a closed system. Simply meeting current North Carolina air toxic regulations is not enough, since such regulations do not exist. The company should be required to use measures that avoid ANY degradation of community water or air quality.

EPA Response: Remedial Design will take into account the potential for exposure to volatile organics from operation of a treatment system which includes air stripping of contaminated groundwater. In general, the exposure via this route is expected to be minimal, due to the high degree of dispersion available relative to the mass of volatile organics removed from the groundwater. When the relatively low yield of the surficial aquifer at the site is taken into account, the volume of water to be treated on a daily basis will be small, and the quantity of volatiles emitted likewise small. We are not sure what is intended in this comment by reference to a closed system in an air stripper; a closed system will result in the buildup of volatile organics in the air used to strip the contaminated water so that the stripper will be rendered ineffective. The only way to completely eliminate some air

emissions would be to treat the air leaving the stripper column, and it is extremely unlikely that the risk associated with the emissions from the stripper would warrant such sophisticated treatment.

I. A plan needs to be in place for controlling potential emissions caused by disturbance of the soil during the materials handling investigation. This plan needs to be available for public comment and EPA response before the work begins. The community should not be re-exposed during this process.

EPA Response: This concern will be addressed as part of the Operable Unit II Feasibility Study to be conducted at the site.

J. We request written answers to comments raised in earlier meetings. (Specifically, see the transcript of the July 21, 1987, public meeting on the Celanese Remedial Investigation, which contains numerous questions and comments.)

EPA Response: Questions and comments raised at the July 21, 1987 Public Meeting to present the RI report were , for the large part, addressed at that time. Four written comments were received by the RPM and each comment had a written response.

K. There have been reports of additional off-site burial areas. The Record of Decision should include a provision for investigation of any of these reported to the EPA in the future.

EPA Response: The State of North Carolina has responded diligently to requests for investigation of additional suspected hazardous waste burial areas. These requests will continue to be forwarded to the State for action, therefore it is inappropriate to include such a provision in the Record of Decision for the site.

L. Proposed remedies that discharge treated water to surface water streams should not increase the level of contamination in those streams. The existing NPDES permit should be reviewed to ensure that all chemicals found in the groundwater will be monitored, that permitted levels avoid any deterioration of surface water quality, and that monitoring by the EPA or the state is adequate to ensure that the permit conditions are met.

EPA Response: Any remedial action which would involve discharge of treated groundwater to a surface stream, either through the existing NPDES discharge to Buffalo Creek or to some other stream, will be coordinated with the NPDES programs at the State and Federal levels. We would expect that any flow from a groundwater extraction and treatment system will not significantly increase flow through the present NPDES discharge, which is permitted 850,000 gallons per day. The permit monitoring conditions may need to be revised to reflect the possible presence of groundwater contaminants; it should be noted, however, that if treated groundwater is to be discharged through an NPDES discharge, effluent monitoring will be done by the facility and not by the State or EPA. A schedule for the monitoring will be included as part of the remedial design at the site.

10. General comments were made concerning the following:

A. Notice of meetings and availability of documents for review prior to meetings has been poor.

EPA Response: All statutory community relations requirements have been met. However, in light of the dissatisfaction of the community, future planning will include additional notification and review times.

B. The citizens request that EPA tell them whether or not their water is safe to drink,; that if contamination occurs that Celanese will clean it up at the expense of the company and that the ROD contain all of this.

EPA Response: A letter was sent to seventeen residents whose wells were sampled during the RI interpreting the results. This letter stated that, based on currently available information, all the wells but four could be presumed to be "safe". Those four were re-sampled by the Agency in August 1987. TCE was confirmed in one well above MCLs and, as a result, it has been remediated. Two wells were found to have unacceptable levels of methylene chloride. These results are believed to be probable analytical artifacts and not contamination emanating from the site. The fourth well reportedly had unacceptable concentrations of arsenic. The footnote to the data reported an "R" which indicated unreliable

data. Additionally, wells upgradient and around the site have been abandoned due to high levels of arsenic. It is believed that these concentrations of arsenic are a naturally occurring phenomena in the Shelby area.

The ROD is only a decision document, therefore, questions of liability cannot be incorporated.

C. Questions were raised concerning the availability of Technical Assistance Grants and a request "that any decision made on the clean-up options at this point include a provision for changes on additional public comment."

EPA Response: The current information available on Technical Assistance Grants was reiterated as well as the current EPA policy that Records of Decision not be delayed or postponed while awaiting the Technical Assistance Grants. The public has been informed that they will be given an opportunity to comment on the detailed remedial design.

4. Remaining Concerns

The only remaining concerns at the site are, drinking water quality and Technical Assistance Grants. The water quality concerns will be addressed as soon as sampling results are received. The concern over TAGs will be addressed as soon as the mechanism for awarding these is in place.

ATTACHMENT

2.0 ADMINISTRATIVE RECORD INDEX

Not included.

ATTACHMENT

3.0 STATE CONCURRENCE

North Carolina Department of Human Resources
Division of Health Services
P.O. Box 2091 • Raleigh, North Carolina 27602-2091

James G. Martin, Governor
David T. Flaherty, Secretary

Ronald H. Levine, M.D., M.P.H.
State Health Director

23 March 1988

Ms. Michelle Glenn
Superfund Project Manager
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Record of Decision
Celanese Fibers Operations NPL Site
Shelby, North Carolina

Dear Ms. Glenn:

We have reviewed the Record of Decision for Celanese Fibers Operations in Shelby, North Carolina. This office concurs with the selected remedy.

Sincerely,

William L. Meyer, Chief
Solid Waste Management Section

WLM/tb/ibm-42

ERRB/RAS
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ATLANTA, GA